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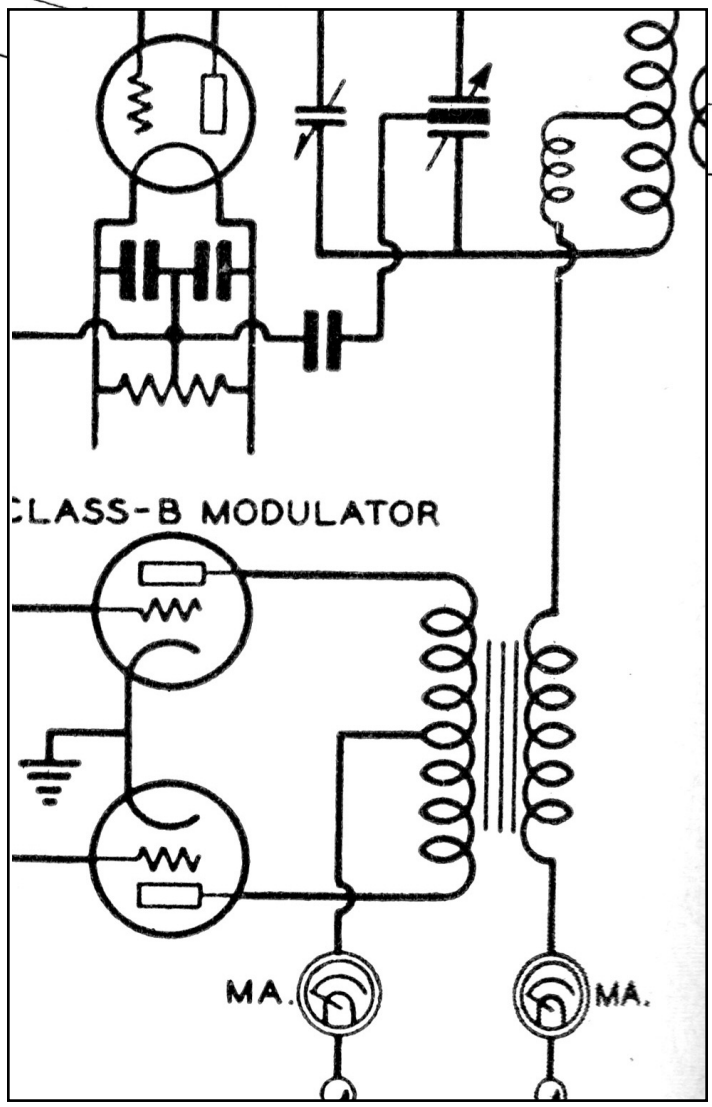
The AWA Journal

Quarterly Bulletin of the Antique Wireless Association®
June 2016, Vol. 56 / #4



See Radiotelephone Modulation Methods — Page 59

CONVENTION PREVIEW ISSUE!

Pre-registration card inside. Also see pages 36-43.

Published for the radio collector, historian, restorer and all vintage communications enthusiasts.

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Originally published as

THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION™

BRUCE L. KELLEY 1914-1997, FOUNDING EDITOR

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Special Conference Website: www.awaconference.com
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Bruce Kelley-OTB *Award*...Bruce Roloson, W2BDR
Equipment Awards.....Geoffrey Bourne
J. Albert Moore Award ....Geoffrey Bourne
Taylor Award .....Pete Yanczer
Tyne Award.....Joe Knight
Television Award .....Richard Brewster

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Please write legibly. Enclosing an SASE speeds replies.

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The Vacuum Tube
Ludwell A. Sibley

The AWA Journal is published approximately four times a year by and for members of the Antique Wireless Association. AWA is a non-profit historical society founded in 1952 and incorporated in the State of New York. *The AWA Journal* is available through AWA membership. Its issuance is subject to change from time to time as to frequency, content, and size. It is not liable in any way for any buying-and-selling transaction entered into as a result of its content.

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FROM THE EDITOR

Interested in writing for the *Journal*?

I'm sorry to have to announce that we are losing two members of our team of Contributing Editors. John Casale (*Key and Telegraph*) and Richard Brewster *(Television)*. John's final column appeared in our last issue. He is expecting an unusually busy year at work and doesn't feel that he can commit to a regular writing schedule. He does have ideas for more articles, however, and we expect to be hearing from him from time to time.

You can read a little about Richard's interesting plans in his column. He and his wife have been long-time volunteers at Mercy Ships, serving on two of their hospital ships. John has accepted the demanding position of Project Engineer, supervising the construction of *Atlantic Mercy*, the newest of the fleet.

If you have ever considered writing a column, or even a single feature article for the *Journal*, this is obviously an excellent time to propose it. It would be a fine opportunity for you to share your writing with friends and colleagues in the hobby, make new friends, and get valuable input about your ideas.

A typical column runs about 1500 words and has two or three photos or graphics. An average feature may run about 3,000 words. These numbers are flexible, however; variations are permitted. Subject matter is up to you, as long as it is material that is of interest to other vintage communication enthusiasts. Interested? Please contact me at mfellis@alum.mit.edu or 847-869-1695.

—MFE

ABOUT OUR AUTHORS

MERRILL BANCROFT
The Campbell Electric Company

Merrill started collecting radios as a teenager over fifty years ago, and after getting out of the Navy began collecting battery radios in earnest. Except for a foray into Atwater Kent cathedrals and tombstones, he has specialized in obscure radio company products, radio magazines and researching company histories from 1922-23. He joined AWA over 30 years ago.

MICHAEL W. MARINARO, WN1M
Amateur Radio at the 1933 World's Fair

Michael Marinaro was first licensed in 1952 as KN2CRH and has been licensed continuously since then, currently holding extra class license WN1M. Previous calls were K2CRH, W5RBB and W1HNJ.

Michael is a graduate of the City University of New York and recently earned a master's degree in History, with honors, from Central Connecticut State University. He is retired from the financial services industry.

Marinaro has authored two recent articles which appear on the Connecticut Humanities Council website http://www.Connecticuthistory.org, "A Diversified Mind: Hiram Percy Maxim" and "Amateur Radio Comes of Age in Connecticut" (a brief history of the ARRL). WN1M operates on all the HF bands in all modes with four stations. A Collins Radio enthusiast, he operates an "S line" and a classic model 51J4 receiver.

Marinaro is a member of the Collins Radio Association and the Antique Wireless Association. He has been an ARRL member for more than forty years. Operating awards include DXCC on seven bands and the CHALLENGE. As volunteer staff curator and historian at the ARRL, Marinaro is involved in organizing the League's collections.

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FROM THE DEPUTY DIRECTOR

Greetings! I am very pleased to announce that AWA has received a gracious and generous anonymous donation of the three Museum campus buildings and property south of Route 5 & 20. Prior to this donation, AWA leased the Museum, Media Center, and Staging Buildings under a long-term lease. This very generous donation means AWA now owns the entire four building, five acre AWA Campus as our permanent home.

Plans are under way for the Annual AWA Convention to be held August 18th to 20th at the RIT Inn. I look forward to meeting you there. The Museum will be open during the day on the Tuesday the 16th, Wednesday evening the 17th, and on Saturday afternoon the 20th. We will be identifying duplicate and surplus items from the Museum to be sold in the Saturday auction at the Convention. A list of items to be auctioned will be listed on the AWA website.

I understand that many of you have asked if scans of AWA documents and photographs could be made available on the AWA website. However, this has turned out to be problematical. Documents and photographs created in 1923 and later are protected by copyright laws. Since AWA, in general, does not own the copyrights of documents and photographs in its collection and based on increasing prosecution of violations by copyright owners, I am concerned about potential legal issues.

I know there are several exceptions to copyright law that allow use of documents, but none seem to apply to the public posting of scans on the web. Remember, I am not a lawyer and do not even play a lawyer on TV. If you have information that would allow us to post scans, please let me know. However, for the moment we will not be posting scans on our website. Sorry.

Do you buy items on Amazon.com? Well, who doesn't? When you shop at AmazonSmile, Amazon donates 0.5% of the purchase price to Antique Wireless Association. Bookmark the link:

http://smile.amazon.com/ch/16-1501004

and support us every time you shop. It is really easy. Just sign in at the bookmark above or go to Smile.Amazon.com and designate the Antique Wireless Association (EIN: 16-1501004) for the AWA to receive 0.5% of your eligible total purchases. You only have to designate the AWA once, but EVERY TIME you want to make an Amazon purchase, sign in using Smile.Amazon.com and you will be redirected to Amazon.com automatically. It is just that easy to support the AWA and it does not cost you anything extra.

— *Bob Hobday, N2EVG*

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MEMBERSHIP NEWS

***AWA JOURNAL* POLICY ON PROMOTING EVENTS:** The *AWA Journal* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Send your information to Marc Ellis, Editor, *AWA Journal*, P.O. Box 1306, Evanston, IL 60204-1306. E-mail mfellis@alum.mit.edu.

Information About AWA and Other Events

NIAGARA FRONTIER WIRELESS ASSN.
August 6, 2016
This annual summer meet will be held at the Buffalo Niagara Heritage Village (formerly Amherst Museum) 3755 Tonawanda Creek Rd., Amherst, NY 14228. From the New York Thruway, take Exit 49 Transit Rd. Rte 78) north nine miles. Left on Tonawanda Creek Rd. just before entering Niagara County. Proceed two miles west to the Museum. The meet will be in the parking lot. Flea market opens at 8:00 a.m. and runs through noon. Entrance fee is $5 and there is no additional fee to set up or sell. Auction begins at about 11:00 a.m. and there will be a donation auction to support the Museum. The museum exhibit opens at noon and includes a room of early radios and TVs. Free coffee and donuts. Lunch is available. For more information visit www.nfwa.net.

AWA ANNUAL CONVENTION
August 17-20
Dual Themes: Wireless Before Broadcasting and Zenith Radio. See "Convention Doings" elsewhere in this column as well as the "Convention Preview" section of this issue. Also check our website at www.antiquewireless.org for the most current details.

News Brief

CC-AWA MEET REPORT

An enthusiastic group of about 190 AWA members attended the March Carolina Chapter meet in Charlotte, NC The lectures and the contest were excellent, the auction successful, and the flea market was jumping. The 8:00 a.m. Le Mans start saw people running through the parking lots filled with about 120 dealer tables. Several flea market tables overflowing with a very unusual assortment of WWII and Cold War Spy radios and associated encryption devices were an unexpected bonus for attendees. Tom Perera gave an updated version of his talk on the "Fabulous Fakes" of Phil Weingarten at the banquet and Ron Lawrence showed one of Phil's fake Leutz sets purchased last year at the flea market.

Recurring Meetings

• The Antique Radio Club of Illinois (ARCI) — Meets bi-monthly. Meets generally held at the American Legion Hall, Carol Stream IL but meets in June in conjunction with the 6-Meter Club of Illinois at the DuPage County Fairgrounds and once per year for Radiofest at the Willowbrook Illinois Holiday Inn. Check website for schedules, details and maps.) Contacts: President, Olin Schuler oshuler@comcast.net; Club Public Contact, Art Bilski, 630-739-1060, clubinfo@antique-radios.org. Website www. antique-radios.org.

• Antique Radio Collectors of Ohio — meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: $10.00 per year. For more info, contact Karl Koogle: mail to above address; phone (937) 294-8960; e-mail KARLKRAD@ GEMAIR.COM.

• California Historical Radio Society — For info on current meetings, call the CHRS hotline: (415) 821-9800.

• CARS, the Cincinnati Antique Radio Society — Meets on the third Wednesday of each month at Gray's History of Wireless Museum, which is part of The National Voice of America Museum of Broadcast-

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ing, Inc., located in a building that is now on the National Historic Register at 8070 Tylersville Road, Westchester, Ohio. 45069. For more information contact Bob Sands at (513) 858-1755.

• Carolinas Chapter of the AWA — Hosts four "mini-swap-meets" each year (in January, May, July and October) plus an annual conference, "Antique Radio Charlotte," on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the website at CC-AWA.ORG or contact Ron Lawrence, W4RON, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail W4RON@carolina.rr.com.

• Central Ohio Antique Radio Assn. – Meets on the third Wednesday of March, June and September at 7:30 p.m. Swap meets: "Cabin Fever" in January and outdoor tailgate in July. December Christmas party. For more info contact Barry Gould at 614-442-1518 or Dave Poland at 614-890-5422 or http://coara.org/.

• Delaware Valley Historic Radio Club — Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: $15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Delaware Valley Historic Radio Club, P.O. Box 5053, New Britain, PA 18901. Phone (215) 345-4248.

• Houston Vintage Radio Association (HVRA) meets the fourth Saturday (January thru October) at Bayland Park 6400 Bissonnet, 9 a.m. in SW Houston. Each meeting includes an auction and program. Annual two-day convention held in February includes three auctions, old equipment contest, technical talks, swap meet, and awards banquet. One day MEGA auctions held in the spring and fall. A newsletter, *The Grid Leak*, is published bimonthly. Event postings, announcements, photos and other features are available on HVRA website: www.hvra.org. Membership is $20/yr. Address: HVRA, P.O. Box 31276, Houston TX 77231-1276 or call Bill Werzner, 713-721-2242; email: werz1943@gmail.com.

• Hudson Valley Antique Radio and Phono Society [HARPS] meets the 3rd Friday of the month 7:30PM at the Episcopal Church of Suffern Annex, 65 Washington Ave., Suffern N.Y. 10901 for info contact Rev. Dale Cranston at (845) 357-1615 or dale.cranston@gmail.com.

• Indiana Historical Radio Society — Active since 1971. Meets in Feb. (Lawrence), May (2-days, Kokomo) and Oct. (Greenfield). Flea market, old equipment contest, and auction at all events. Meet details and club info at website www.indianahistoricalradio.org. $15.00 annual dues includes the IHRS Bulletin published quarterly. Contact Herman Gross, W9ITT, 1705 Gordon Dr., Kokomo, IN 46902, 765-459-8308, email w9itt@comcast.net.

• London Vintage Radio Club — This Ontario, Canada club meets in London on the first Saturday of January, March, May, and November. Annual flea market held in Guelph, Ontario in June. Contact: Dave Noon, VA3DN, 19 Honeysuckle Cr., London, ON N5Y 4P3, Canada. Email: va3dn@execulink.co. Website: http://lvrc.homestead.com/index.html.

• Mid-Atlantic Antique Radio Club (MAARC) — Meets monthly, usually on the third Sunday of the month at the Davidsonville Family Recreation Center in Davidsonville, MD. (But meets once or twice a year in Northern Virginia—check website for schedules, details and maps.) Contacts: President, Steve Hansman, 855 Arundel Drive, Arnold, MD 21012, (410) 974-0561, email: shans01a@ comcast.net; Membership Chair, Geoff Shearer, (703) 818-2686, email: gshearer2@verizon.net. Website www.maarc.org.

• The New Jersey Antique Radio Club — Meets the 2nd Friday of the month 7:30 p.m. at either Info Age 2201 Marconi Rd. Wall Township N.J. 07719 or Bowen Hall, Princeton University. We hold three annual swap meets and four seasonal repair clinics. Visit the club's website for details www.njarc.org or contact NJARC President Richard Lee (914) 589-3751 or president@njarc.org.

• Northland Antique Radio Club (Minneapolis/St. Paul) — hosts four events with swap meets each year (in February, May,

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September and November) including an annual conference, "Radio Daze," for two days in mid-May. Annual dues are $12.00, which includes a subscription to the club's quarterly newsletter. For more info, visit our website at www.northlandantique-radioclub.com.

• Northwest Vintage Radio Society — Meets the second Saturday of each month at Abernethy Grange Hall, 15745 S. Harley Ave. Oregon City, OR. Meeting starts at 10:00 a.m. Membership $25.00 per year. Guests welcome at all meetings and functions except board meetings. Spring show, the second Saturday in May. For more information, contact Mike McCrow 503-730-4639; e-mail: tranny53@comcast.net.

• Oklahoma Vintage Radio Collectors — Meets second Saturday of each month, (except for April, October, and December), at Hometown Buffet, 3900 NW 63rd St., Oklahoma City, OK. Visitors welcome. Dinner/Socializing, 6 p.m., meeting, 7 p.m. Swap meets on second Saturday in April and October at 8 a.m., Midwest City Community Center, 100 N. Midwest Blvd., Midwest City, OK. Membership $15/year including monthly *Broadcast News*. Info: contact Jim Collings at (405) 755-4139 or jrcradio@cox.net. Website: www.okvrc.org.

• Ottawa Vintage Radio Club — Usually meets the second Wednesday of every month (except July and August) in the Conference Room, Ottawa Citizen, 1101 Baxter Rd., Ottawa, Ontario, Canada. Auctions in October and May. Call Paul Guibord (613-523-1315), or check www.ovrc.org for details.

• The Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea markets, contests and clinics held at least four times yearly. A fall auction is included in September and our annual luncheon program is on the first Saturday in December. An annual Tri-State Radio Fest is held in April. Our journal, *The Pittsburgh Oscillator*, is mailed quarterly. For more information visit us at http://www.pittantiqueradios. org, email President Chris Wells at radioactive55man@comcast.net, or phone Treasurer Tom Dixon at 412-343-5326.

• Society for Preservation of Antique Radio Knowledge (SPARK) — Meets monthly at Donato's Pizzeria, 7912 Paragon Rd., Centerville, OH. Annual swap meet. Membership $15/yr. Write SPARK Inc., c/o Dan Casey, 10075 Morrow-Rossburg Rd., Pleasant Plain, OH 45162 or call Dan Casey at (513) 265-8466 or e-mail dansradioland@ gmail.com

• Texas Antique Radio Club — Meets alternate months in Kyle and Shertz, TX. Contact: Doug Wright, 625 Rolling Hills Dr., Canyon Lake, TX 78133. Email: dwjw@gvtc.com; website www.gvtc.com/~edengel/TARC.htm.

• Vintage Radio and Phonograph Society (VRPS) meets monthly on the third Saturday. Located in the Dallas, Fort Worth Metroplex, our current activities are annual convention, auctions, swap meets, repair training sessions and monthly programs. For details visit our website www.vrps.org, or by contacting VRPS President Jim Sargent at (817) 573-3546 or bsargent@swbell.net.

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE

Cost: $700 (U.S.), $800 (elsewhere.) Make out your check to Antique Wireless Association and send it to AWA Membership, P.O. Box 421, Bloomfield, NY 14469-0421. E-mail awamembership@ rochester.rr.com.

AWA NETS (EASTERN TIMES)

SUNDAY:
7237 kHz, SSB, 12 noon, NCS: Various
3840 kHz, AM, 7PM held only during EDT
3837 kHz, AM, 4PM held only during EST
NCS: Joe, W3GMS

MONDAY:
1945 kHz, SSB or AM, 8PM, NCS: N3IBX

MONDAY-WEDNESDAY-FRIDAY:
The AWA Bruce Kelley Memorial Net
3837 kHz, SSB, 9:30AM
NCS Monday, Jeff-W3JW
Wednesday, Roy-W2TWS
NCS Friday, Doug-WA3DSP

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Nominations for AWA Awards

It is time to nominate candidates for six prizes to be given at the AWA 2016 Convention.

The **AWA Houck Award for Documentation** goes to an AWA member who has written several original articles on radio development or history in *The AWA Journal, AWA Review*, or other publication. (This can include a book on a related subject.) Send your selection to the Houck Awards Administrator, giving your reasons why the nominee should receive the Award. The address: Barney Wooters, 8303 E. Mansfield Ave., Denver, CO 80237.

The AWA Houck Award for Preservation is for a member who, through personal accomplishment, has acquired, and preserved by documenting, an outstanding collection of radio artifacts. Send your selection to the Houck Awards Administrator, giving your reasons why the nominee should receive the Award. The address: Barney Wooters, 8303 E. Mansfield Ave., Denver, CO 80237.

The Bruce Kelley-OTB Award is given to the member who publishes in *The AWA Journal* an article judged to be the most outstanding, original, historical presentation of the award year. For this year, articles in the Summer, 2015 issue (56-2), January 2016 issue (56-3) and this issue, June 2016 (56-4), will be considered. The articles must have been written specifically for publication in *The AWA Journal,* not reprinted from other journals. All AWA members are eligible for this award except those on the Award Committee and the *Journal* Editor. Simply identify the article and the nominee, with reasons for your selection; send to committee chairman Bruce Roloson, 2 Walnut Pl, Apalachin, NY 13732 or broloson@stny.rr.

The J. Albert Moore award is a companion to the Bruce Kelley-*OTB* Award. The award comes to us through The Antique Radio Club of America, which was merged into AWA a few years ago. It was originally given for the most outstanding article (any category) contributed to the *ARCA Gazette* during the publication year. Though the award continues a memorial to Mr. Moore's contributions to ARCA, it has been re-oriented as a companion to the Bruce Kelley-*OTB* Award — honoring articles that do not fall into the historical category considered for the latter.

And so the Moore award will be given "...to the article, or series of articles, deemed to be the most outstanding of those dealing with radio hardware (radio sets, radio systems or components) printed in *The AWA Journal* during the award year. Eligible articles include those dealing with troubleshooting, restoration, performance evaluation, identification methods, and history." For this year, articles in the Summer, 2015 issue (56-2), January 2016 issue (56-3) and this issue, June 2016 (56-4), will be considered. All AWA members are eligible for this award except those on the Award Committee and the *Journal* Editor. Simply identify the article and the nominee, with reasons for your selection; send to committee chairman Geoff Bourne, 405 8th Ave., Saint Albans, WV 25177.

The **Taylor Award**, in memory of John Taylor, RCA TV developer, is for "preserving television history." Send nominations to Bruce Roloson, 2 Walnut Pl, Apalachin, NY 13732 or broloson@stny.rr.com.

The Tyne Tube Award is presented, in remembrance of Gerald F.J. Tyne, for contributions to preserving or documenting the history of tube technology. Nominations may be sent, with supporting reasons, to administrator Joseph Knight, jaknight@mac.com.

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Convention Doings

Dear Friends.

As you know our convention has been experiencing the same drop off in participation that has affected many other public events. In most cases the response has been to cut back on the quality of what is presented or to raise the price.

This year we looked over the budget. We used a committee approach to evaluate what we felt was most important and what you told us you felt was most important. Based upon these findings, we shaved off a number of costs in areas that would have the least impact on your Convention experience, shortening the event by one day.

But there are many more areas in which we have *not* made any cuts — including our lectures and presentations, our contests, and the camaraderie that has always been a hallmark of the AWA meets. So why am I telling you all of this?

I love this Convention. From the day that I rather reluctantly took the reins, I have seen some very good times. I have met so many of you that participating in the Convention is more like visiting with a group of friends. The opportunity to spend hours talking about the manufacture of a certain radio or vacuum tube, or the history of a certain epoch in time, is something you just can't buy!

In the near future you will receive a letter about the program of the Convention. We will also post the activities on the AWA website. Look them over.

2016 will prove to be one of the best years we have ever had for our events. Look for some really fresh talent as well as exciting presentations from some of our old friends. The second phase of Museum construction will be ready to view with some really great NEW exhibits. The contests have been redone to include the more modern Amateur Radio Gear. And we are keeping the Pizza and Movie nights.

This year's movie by the way is "Western Union" with Randolph Scott. It is an exciting western about a reformed outlaw who tries to make good by joining the team wiring the Great Plains for telegraph service in 1861. I know you will enjoy it.

Many people are giving of their time and resources to make this year's event a great one. So what am I asking from you? Just come! Make the journey to Rochester! I would be delighted to see you there.

Roy Wildermuth, W2IT
Chairman 2016

Summary of Minutes

AWA MEMBERSHIP MEETING OF 11/1/15

The meeting was called to order by Deputy Director Robert Hobday at 12:39 p.m. on November 1, 2015, in the Conference Center of the AWA Museum Complex in Bloomfield, NY. Present were eleven officers and trustees including two by conference connection. Three AWA members were in attendance. Hobday declared a quorum.

In general comments, Hobday noted that storage space in the Museum continues to be a problem. Since the Museum's opening in May 2013, 3,500 guests have visited. Tourist group visits were up in Fall 2015, and more tours are scheduled for 2016. The Arthur Collins Legacy has joined forces with the AWA to produce a 24-minute DVD documentary on Arthur Collins. Profits of the sales through the AWA Press will be divided between the two organizations. Marketing of the AWA is moving away from collectors' journals to publications directed toward the general population, beginning with the Western New York region.

By proxy vote the membership approved the re-election of trustees Stanley Avery, David Bart, James Kreuzer, John Terrey, Morgan Wesson and Roy Wildermuth to a term to expire in 2018. From a total of 277 proxy ballots returned and counted, 266 voted for, two against, and nine abstained. No nominations were presented from the floor. A motion to accept the proxy vote was passed unanimously. The Minutes of the November 2, 2014 Membership Meeting were approved as read.

Deputy Director Hobday submitted the Financial Report. The estimated total net

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loss of $28,942 in 2015 will be addressed by the Board. The present endowment, which has grown by a greater amount than the net operating loss, now stands between $750,000 and $800,000, depending on the market level. Future revenues generating options will become available after the completion of Phase II through museum rentals and more tour opportunities. The cost for Phase II Museum construction, presently at $43,000, will henceforth be reported as an offset to the Museum Development Fund at just over $200,000. Annual eBay sales income stands at $7,500. The auction at the Spring Meet of 600 items returned a balance just under $10,000.

Insurance has increased appreciably, but the Museum collection is now fully insured. Expenses related to acquisition and accession were higher in 2015, owing to the transport of the Western Union station from the Boston area and a Collins transmitter from Albuquerque, NM. One donation has offset the cost of the Western Union acquisition. The Accession Committee has now accessed the Collins VOA transmitter (from Delano, CA), placing it under NY State museum protection.

Richard Neidich presented the Membership Committee Report. Membership plateaued in 2011-2013, and declined in 2014 at a slower rate than in previous years. The same is true for attendance at the Annual Conference. These numbers reflect trends in other organizations. Increased membership and participation are goals to be addressed by the Board. Membership dues pay for publications but not for Museum expenses. Values to the membership remain a priority.

The membership meeting adjourned at 1:32 p.m.

Respectfully submitted by
William L. Hopkins, *Secretary*

Summary of Minutes

AWA BOARD MEETING OF 11/1/15

The meeting was called to order by Deputy Director Robert Hobday at 1:47 p.m. on November 1, 2015, in the Conference Center at the AWA Museum complex in Bloomfield, NY. Present were eleven officers and trustees including two by conference connection. Three AWA members were in attendance. Hobday declared a quorum.

In general comments, Hobday reported that AWA membership in the Rochester Regional Library Council is providing benefits, such as access to equipment and furniture. The Fairport Library has donated chairs, tables, desks, 24 feet of library shelving, 6 flat screens, and a laptop computer. The Rochester Institute of Technology has already donated 139 feet of shelving for artifact storage. The Council's Archives Committee recently visited the AWA Museum. Considerable documentation from the VOA offices in Washington, D.C., as far back as 1942, has begun to arrive and will be accessed into the AWA Archives.

Secretary Hopkins reported the results of the 277 proxies received and accepted at the Membership Meeting, to re-elect six trustee members to a term expiring in 2018. By motion, officers were elected for 2016: Director, Thomas Peterson, Jr.; Deputy Director, Robert Hobday; Curator, Bruce Roloson; Secretary, William Hopkins; Treasurer, Stanley Avery. The Minutes of the May 3rd meeting were approved as read.

Curator Bruce Roloson announced the completion of the second level of storage space at the AWA Conference Center (Bldg. 4). Phase II construction is halfway finished, including a complete Western Union Telegraph Office. In the past few years, the number of artifacts received has quadrupled, which has required a streamlining process for storage, accession or sales. Alexander (Sandy) MacMillen, the new Registrar, now coordinates the process. The 2016 AWA Convention is planned for the week of August 15. The themes will be Zenith Radio and the pre-broadcast era. The Accession Committee presented its annual report.

The Finance Report presented at the Membership Meeting was approved. AWA assets have increased in 2015 from 1.2 to 1.3 million dollars. Near-term increases in

(continued on page 19)

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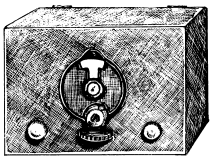
AMATEUR RADIO



EDITED BY **TIM WALKER, W1GIG**, 19 WOODSIDE AVE., WESTPORT, CT 06880, W1GIG@ATT.NET, *PLEASE INCLUDE SASE FOR REPLY.*

Bruce Kelley QSO Party, Linc Cundall Contest, and AM QSO Party Results

Here we go with the Spring issue. It does not seem much like spring as we are still getting over the Holiday Season, trying to get rid of the extra pounds etc. It must be spring, though, since I have two "on the air" events to report to you. Last night it rained and blew like crazy, and all I could think of was "Man I'm glad it was not snow!" But that is one of the advantages of living in Southern New England.

As I'm sure you have noticed, our ranks continue to thin. Even so a big bunch still enjoy the sounds of early radio and make the effort to get those chirpers and whoopers on the air. If any of you feel that effort is beyond your capabilities, please let me know as I get occasional requests from members about the availability of 1920s equipment.

That's how I got started. John Rollins asked me if I'd like to try a TPTG breadboard that he had developed. After I said "yes, he gave it to me on permanent loan with the proviso that I use it on the air or give it back. The set is a design breadboard that he built to try the concept and was the basis of an article in the *OTB*. The final version went to Tommy Thompson, W2UK, and he left it to the Museum where you can see it in the ham section. In the same vein, if you'd like to try out one of these rigs, let me know and I'll try to make a match.

On to the contests,

Tim

32nd Anniversary Bruce Kelley Memorial 1929 QSO Party Results For December 2015

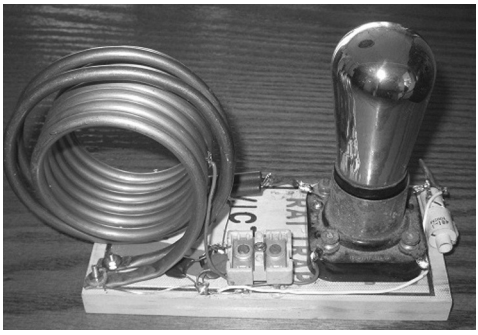
By Scott Freeberg, WA9WFA

This event was held on the first two weekends of December 2015 with approximately 60 stations participating. The winner this year is Bill, K4JYS, from Smithfield, North Carolina with a high scoring 69 contacts! 2nd place was snagged by John, N2BE, from Branchville NJ with 60 contacts, 3rd place was Burt, KB0MM, from Bemidji MN with 54 QSOs. The TOP TEN looks like this: K4JYS(69), N2BE(60), KB0MM(54), N3GJ(49), KB0ROB(47), N8YE(42), NGJV(40), VA3AWA(38), WB9WHG(33), W1ZB(33), NE1S(33).

Twenty-one US states and two Canadian provinces were heard this year. Forty two logs were mailed/emailed in. Thanks to those who sent in their logs. I encourage you to submit your log no matter how many or how few contacts you made. We all enjoy reading the results and seeing how we all did. I looked through nearly all the logs and recorded all the stations worked in order to figure out there were 60 stations operating in the event! All 60 call signs are in the "List of all 29 Stations Participating" so you can see who was and wasn't there this year.

I saw several new stations in the event, which was exciting! I also missed seeing several old friends who were always there. I am sorry to report that our good friend and "Mighty Midwest Glowworm" Russ W0CWU became an SK about one month before the 1929 QSO Party. Russ was a major 1929 player for many years. Many of us will miss hearing his sweet sounding "Big Bertha" MOPA and good fist.

Thanks to all that sent in photos of your fabulous station! Here is a photo of Don VE3LYX's "Victory Rat Trap" transmitter, which used an 01A and later a 45. I've seen a lot of transmitters but nothing as unique as Don's "Rat Trap."



VE3LYX's "Victory Rat Trap" Hartley Rig

At WA9WFA, propagation was very poor both weekends both on 80m and 40m. I just wasn't hearing the signals so I missed working a lot of my friends. I even struggled hearing my Zero land neighbors who are usually S-8 and I can barely copy them at S-2. Hoping for better conditions next winter! Still, the 29 QSO Party is the radio highlight of my year! Thanks to all who participated. I hope you get as much enjoyment from the event as I do!

Signals seem to be getting more stable as each year passes but I was still treated to some wonderfully wild 1929 signals including my favorite 'wind modulated' signals, the 'whoopers', the 'tweeters', the 'howlers', the 'chirpers', and of course those crazy guys running raw AC on the plates and the spark coil guys! I love 'em!

Bruce Kelley's call, W2ICE, was heard in the 1929 QSO Party For the second year. This year Paul, N1BUG, operated with Bruce's call sign with the permission of the AWA for a special event station and ran with both weekends as W2ICE/1. W2ICE/1 worked 65 station including 29 on 40m, 32 on 80m, and 4 on 160m.

A special event W2ICE QSL card will be issued to those stations that made contact. Be sure to send your QSL card for the contact and SASE to Ed Gable c/o AWA Museum, P.O. Box 421, Bloomfield, NY 14469-0421 to receive the W2ICE QSL card! We plan to have W2ICE operate from a different location each year and pass the fun around North America. Our thanks to the AWA and especially Ed Gable for doing this for us. Thanks, Ed!

The first 1929 QSO Party was held in 1983. Nineteen stations participated in that first event and 32 years later the 1929 QSO Party is still having fun with 60 stations. The 1929 QSO Party was started by Bruce Kelley, W2ICE (SK), Linc Cundall, W2LC (SK), and George Batterson W2GB (SK). Bruce Kelley was the first 29 Manager, followed by John Rollins W1FPZ (SK), and now me for the past 12 years.

Submitted Logs

District	Call	Transmitter	Qth	40m	80m	160m	Total
W1	W2ICE/1(N1BUG)	TNT	ME	29	32	4	65
	NE1S	HART	ME	11	21	-	32
	W1ZB	TNT	MA	9	24	-	33
	NV1X	HART	VT	-	9	-	9
	W1GIG	TPTG	CT	1	5	-	6
W2	W2AO	HART	NY	9	17	-	26
	WT2W	MOPA	NY	10	17	-	27
	N2JPR	MOPA	NY	1	10	-	11
	W2LB	HART	NY	13	11	-	24
	WA2OVJ	HART	NY	3	1	-	4

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District	Call	Transmitter	Qth	40m	80m	160m	Total
W2	WB2QMY	TNT	5	13	-	18	
	N2BE	HART	NJ	25	35	-	60
	N2OUV	HART	NY	-	14	-	14
W3	N3GJ	HART	PA	21	28	-	49
	W3BYM	TNT	MD	7	15	-	22
	N3TE	TGTP	MD	16	-	-	16
	W3FJJ	TNT	DE	3	17	-	20
	W3GMS	TNT	PA	-	15	-	15
W4	K4JYS	HART&TNT	NC	25	41	3	69
	N4GJV	HART	NC	12	26	2	40
	K4LJH	HART	VA	-	21	-	21
	KJ4RGH	TNT	VA	-	9	-	9
W7	KK7UV		MT	11	15	3	29
	W8KGI	MOPA	NM	5	-	-	5
	W7LNG	TNT	OR	4	2	-	6
	WB2AWQ	HART	NV	6	2	-	8
W8	N8YE	TPTG	OH	21	21	-	42
W9	N9HAL	HART	WI	15	14	-	29
	W9TFC	HART	WI	-	20	-	20
	WB9WHG	MOPA	WI	10	23	-	33
W0	K0KP	HART	MN	-	17	-	17
	K0KCY	HART	MN	9	13	-	22
	W0LGU	MOPA	MN	9	15	-	24
	KB0ROB	MOPA	MN	3	19	25	47
	KB0MM	MOPA	MN	20	30	4	54
	WA9WFA	COLPITTS	MN	8	21	-	29
	KI0DB	MOPA	MN	-	11	-	11
	W0VLZ	TNT	MN	-	5	-	5
VE	VE3AWA	TGTP	ONT	12	26	-	38
	VE3LYX	TNT	ONT	1	7	-	8
	VE7SL	MOPA	BC	12	16	1	29
	VE7BDQ	COLPITTS	BC	6	1	-	7

List of all 1929 stations participating as far as I can tell from going through your logs.

W2ICE/1 (N1BUG), W1ZB, WA1LGQ, NE1S, K1TMJ, , W1ZB, NV1X, W1GIG, WU2D, W2AO, N2OUV, N2BE, WT2W, W2LB, N2JPR, WA2OVJ, W2LBM, WB2AWQ, WB2QMY, W3GMS, N3GJ, W3BYM, W3FJJ, N3TE,NO3M, K4JYS, K4LJH, KK4RF, ,N4GJV, KJ4RGH, W4HWT, , WA6VYN, KK7UV, W7LNG, K7SF, , N8YE, WA8DOF, KD8LW, W8KGI, W8AU, N9OB, N9HAL, WB9WHG, W9TFC, KE0Z, W0LGU, W0LS, W0LGU, K0KP, , KI0DB, K0KCY, KB0MM, KB0ROB, WA9WFA, W0VLZ, VA3AWA, VE3LYX, VE7SL, VE7BDQ, N4OA OR QT BOB NC??

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Soapbox 2015

WA9WFA Propagation was terrible both weekends. The east coast was tough, and even the Midwest was difficult with the ZEROES often just above the noise. Was fun working W2ICE/1 and Paul did a great job!

W7LNG Second weekend 80m dead? + bad QRN on 40, wind on antenna pulled freq. Had pwr sup tube rect shorted so went to ½ wave rect & "ruffed" note. All 6 of my QSO's were named "Steve". (Sounds like Bud accidentally worked the 1929 STEVE QSO Party :-)

W1GIG Didn't work many but I had a good time in the brief times I had. Worked W2ICE ! loud and clear.

K4LJH we had some of the best band conditions here on the east coast. Both weekends were good with low band noise and not much WSB/QRN. This year I ran 120 cycle on the plate of the Hartley and received some very good reports

WT2W I have fun with the BK, the chirps and burps make me think that's the way it was back in 1929

KB0ROB I had a hoot operating my 01A's and homebrew Ether-Sniffing regen RX with my HB station monitor.

W8KGI I missed the first weekend because I had the flu. (bummer)

VE3LYX I ran the whole second weekend on my 1929 Hartley rig built on a Victory Rat Trap with a mouse trap key. The Victory company assures me the design has not been changed since the 1800s so it is period correct.

VE7SL Conditions were nothing short of terrible on both weekends. The only odd temporary lift in propagation allowed the eastrn signals to make it back here.

N3GJ Conditions seems to be down from last year, the sigs on 80m just didn't seem to be in there as good as they should have.

VE7BDQ There was…wind and rain conditions here which caused the Push-pull Colpitts 45s to waver around the frequency.

W1ZB As usual I made most of my contacts the first weekend. I didn't hear too many far away stations this year…

K0KP Had a great time with a much more limited presence than last year. Enjoyed working W2ICE/1 in Maine as well as all the regulars and a few new ones.

Report on the 2016 Linc Cundall Memorial CW Contest

By Tim Walker, W1GIG

The 2016 Linc Cundall contest took place on Wednesday/Thursday January 14/15 and on Saturday/Sunday January 16/17 on 160, 80 and 40 Meters. Attendance was pretty good with about 40 participants. The winner was John Bogarth from NJ with 32 QSOs and a score of 384. Second was Bob Hoffswell from IL with 198 points and third was Larry Szendrei of ME with 117 points. John took advantage of his 1928 Hartley and 10 Watts to get the maximum score from his contacts. It makes a big difference to go QRP and use a receiver that qualifies.

Dominating this view of Larry Szenderei's vintage shack is his "Old Buzzard" rig running "300 watts of antique power."

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Following these experts there were many logs that showed good scores and were filled with comments about having a good time. Their efforts are greatly appreciated as without them there would be no stations for the winners to work. Thanks again to all that made the effort.

You may have noticed that Mike Murphy, WU2D was not the usual contest manager. Mike begged off in December due to the press of his job and promoted yours truly to handle the announcements and compile the results. I was able to fill in for him, and it has helped me to appreciate the work that it takes to do the job.

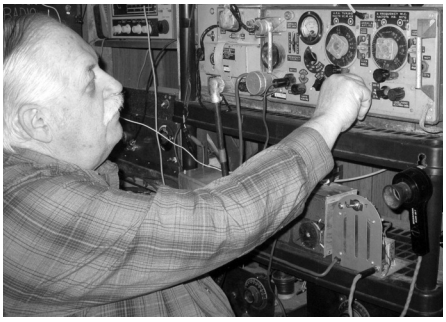
Now, here we go with the scores:

2016 Linc Cundall CW Contest Scores

Area	Station	160	80	40	Total
1st	NE1S		72	45	117
	W1ZB		72		72
2nd	N2BE		168	216	384
	WB2AWQ			18	18
	KC2RZZ			5	5
4th	K4LJH		24		24
	K4JYS			10	10
8th	W8KJI			45	45
9th	AA9DH		72	126	198
	WB9WHG		36	33	69
10th	KB0ROB	2	26	16	44
	KB0MM		39	57	96
	W0VLZ			36	36
VE	VE3AWA		40		40
	VE3LYX		38	32	70

2016 AWA AM QSO Party Report
By Janis Carson

The AWA AM QSO Party had some interesting old equipment on the air this year. W1HRX and W2AN were both operating to give participants a chance at making extra points. Most of the activity was on 75 and 40 meters. I am surprised more people do not use 20 meters for the 5 point per QSO bonus, regardless of power level. The surprise this year was the advantage of using power (considerably) below 100 watts for a winning strategy.



Don Dulmage, VE3LYX, entered the AM contest with this 1939 vintage Canadian tank set souped up to 18 watts.

This is a chance to hear a wide variety of vintage gear and to talk to some of the friendliest people on the air. While use of older tube and solid state gear is encouraged, we also want to welcome people using modern solid state gear, home brew Class D and E gear, or Flex Radio equipment as well. For full details, see:

http://www.antiquewireless.org/awa-amplitude-modulation-qso-party.html

Don Dulmage VE3LYX ran a unique 1939 vintage Number 19 WW2 military tank radio set souped up from the stock 6 watts to a rock crushing 18 watts. The Number 19 uses grid modulation. The set used was manufactured in 1943 and is a Canadian MK2 version. It has both English and Russian markings due to a lend lease program for WW2 allies. This setup racked

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Event coordinator Carson included a couple of pictures with her report, but these accidentally didn't make it to the Editor's desk. However, here from the Journal*'s files is the transmitter she used to run up a top score in the 2014 Rollins DX event. It's a Johnson Viking Adventurer with a home brew VFO.*

up 52 points for a win this year.

N2BE ran a Central Electronics 20A (1954) on 80 meters with a home brew VFO, a home brew 32-watt amp (1963) using a single 811A, a Hammarlund HQ120X (1939) receiver and an inverted L antenna. On 40 meters, he used a 1948 World Radio Labs Globe Champ 150 at 80 watts with one crystal (7290) to a dipole; receiver was a National NC-101X (1937). He scored total 44 points for second place.

WA2MER (when he was not being a flagship station) ran an Eico 720 transmitter with a 730 modulator into a Drake L-7 at 250 watts, receiving on a 75A4. He scored 22 points for third place this year.

We also heard from people with modern rigs such as WA2ZNC with a TS590, running a G5RV.

The W1HRX flagship station reported 32 QSOs.

The W2AN 40 meter flagship had 8 QSOs.

The W2AN 80 meter flagship provided 48 QSOs.

SILENT KEYS

We record the passing of the following AWA member with deep regret.

WILLIAM H. ROSS, W9WR (ex W9OXL), 86, (2-29-16) was employed in the financial services industry for more than 50 years, working for Merrill Lynch, William Blair and Morgan Stanley. He was still commuting to work until a month before his death. Ross attended Wabash College and graduated from Cornell University's Hotel Management School before earning an MBA from the University of Michigan. During the Korean War he was a supply officer in the U.S. Navy stationed in Hawaii. As a teenager and Eagle Scout, Ross built and operated amateur radio stations, an interest sustained during his lifetime. Ross lectured at the Winnetka Historical Society about his collection of early radio-show premiums featuring shows such as *Gangbusters* and *The Lone Ranger*. He was also a collector of vintage electric model trains, American Indian pottery and early electronic instruments, including a functioning television set from the early 1930s. Ross lived in Kenilworth, IL. Thanks to Geoffrey Bourne and Ed Gable, K2MP.

Please submit all information about members who have become Silent Keys to Charles S. Griffen, W1GYR, 400 Seabury Dr., Apt 4153, Bloomfield, CT 06002-2660. Silent Key notifications must confirm the person's death by one of the following means: a letter from a family member, a copy of a newspaper obituary notice, a copy of a death certificate, a letter from the family lawyer or the executor or mail returned by the U.S. Postal Service marked "Deceased."

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AT THE MUSEUM

Visit us on the Internet at http://www.antiquewireless.org

MUSEUM MANAGEMENT AND STAFF

Thomas Peterson, Jr.
Director

Robert Hobday, N2EVG
Deputy Director

Bruce Roloson, W2BDR
Curator
Accesion Committee Chairman

Ronald Roach, W2FUI
Operations Manager

Lynn Bisha, W2BSN
Associate Curator

Alexander MacMillen
Registrar

Warren Wiedemann
IT Manager

Felicia Kreuzer, KA2GXL
Assistant Curator

James Kreuzer, N2GHD
Assistant Curator
Media Librarian

Roy Wildermuth, W2IT
Assistant Curator

Ed Gable, K2MP
Curator Emeritus
Historian

Stan Avery, WM3D
Treasurer
Museum Store Manager

William March
Assistant Registrar

MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Museum Curator Bruce D. Roloson, W2BDR, Curator, P.O. Box 478, 2 Walnut Place, Apalachin NY 13732, e-mail broloson@stny.rr.com. *The Antique Wireless Association is an IRS 501(c)3 charitable organization.*

From Bruce Roloson, W2BDR, Curator, AWA Museum

Phase 2 of Museum development is progressing well. The Telegraph room is almost complete and display material is ready to install. We are waiting for the ceiling to be painted and flooring to be installed. Our first Telephone display, a working vintage phone system, is in its final planning stages.

The Teletype display, currently being viewed in the Museum, will be moved to its Phase 2 location in the Telegraph and Telephone section. The general display area has had its shelving installed and is ready to for the installation of lighting and flooring.

The VOA display is also awaiting its flooring — which will be as close as possible to the original flooring in appearance. Several of the current displays in the existing Museum will be relocated for a better flow for tours. Once all this construction is complete, the entire Museum will be cleaned and Phase 2 should be ready to be opened for tours.

One of the major problems at this point is storage. We are receiving donations all the time of good material that could be sold on eBay or at the Spring Meet and Convention auctions. But in the meantime we need places to keep it. We are currently looking for ways to expand our storage facilities so that they will serve us for several years to come.

From Ron Roach, W2FUI, Operations Manager, AWA Museum

AWA now owns the entire Museum campus, including the Museum proper, Media Center and the Gauss Road Storage and Staging Building. Deed transfers have been completed and an agent for Selective Insurance has recently toured the entire property.

A Boy Scout winter encampment was held in Veterans Park, which is adjacent to the Conference Center, on the last weekend in January. One hundred scouts set up their tents on Friday evening and remained until Sunday.

In anticipation of the event, temporary HF and VHF/UHF antennas and stations were set up at the Conference Center and extra do-

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cents opened the Museum for tours all day Saturday. During the morning, Cub Scouts joined the event. Several of them witnessed on-the-air operation with their parents in the Conference Center in addition to participating in their own outdoor programs at the park. Over fifty Scouts and their parents toured the Museum in the afternoon.

The completion of Phase 2 rapidly approaches. The new lighting has been installed, a new breaker panel has replaced the original unit and final touches have been made to the VOA installation. Details including fire extinguisher installation, exit and emergency lights and special flooring in the Western Union station and VOA are being completed.

Chrisanntha Construction is leveling the five aisles of shelving prior to the installation of the LED strip lighting. This shelving will provide 304 linear feet for artifact display. Our electrical contractor, Steve Bradford, is installing two furnaces in the loft that will provide heating and cooling for this 3,920 square foot portion of the Museum. Bradford is also adding power drops to the VOA and the shelving aisles.

Denisi Flooring will complete Phase 2 when they install the plank flooring, the special flooring in the Western Union station, and a replica of the 1965 flooring within the VOA remote audio center.

The 2016 Spring Meet on Saturday, May 7th, will be held at Veterans Park with the usual artifact sale in the morning and an auction to be held at the Veterans Park Annex in the afternoon. Since the Annex is currently being leased from the town by the AWA, many of the artifacts for the Spring Meet sale and auction and the August conference are already in the Annex with additional items being added during Tuesday work days. Estes Auctioneers will return to handle the auction.

MEMBERSHIP NEWS, *cont. from page 11*

income will come from Museum visitors, space rental, publication sales, auctions and expense reductions.

Richard Neidich reported that the focus on memberships and publications remains the priority. A membership decrease of 9.2 percent in 2015 is owed partly to the reduction to a 2-month membership renewal period, which is benchmarked to publication of the *Journal*. At present, membership stands at 1464 from the U.S., 53 from Canada, and 39 internationally. Of these, 181 are Life Members. The AWA websites receive approximately 1,000 visits per day. One Chinese search engine is also channeling surfers to the sites. Dues payment by PayPal has doubled.

Ron Roach, Operations Manager, reported that big changes are underway at the Museum. Completion of Phase II will permit a significant increase in artifact exhibits to be visible along four aisles, each 19 feet long in back-to-back displays. Each will be internally lighted. Artifact loan to other organizations continues. The old AWA Annex has been temporarily rented to house intake overflow until new storage shelving is completed. Dan Waterstraat has assumed responsibilities for property code compliance.

Hobday presented David Bart's AWA Press Report, announcing completion of the Collins DVD production and a forthcoming book. After discussion, the Board approved the creation of an *ad hoc* committee comprised of AWA members and non-members to address issues and the future development of the AWA. Non-members on the committee will be drawn from leaders in business, education and museums.

The board meeting adjourned at 3:59 p.m.

Respectfully submitted by

William L. Hopkins, *Secretary*

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THE ITEM IN QUESTION

Spotlighting Noteworthy Artifacts From the Collection of The AWA Museum

BY WILLIAM HOPKINS, AA2YV • EMAIL: WHOPKIN4@NAZ.EDU

The Hertzian Parabolic "Grosser Oszillator" and "Resonator"

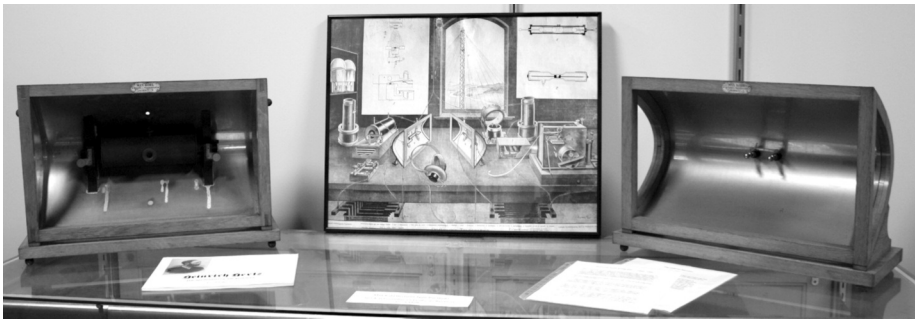
Heinrich Hertz' Inventions

Located directly next to the AWA Museum's "Pioneers Gallery" stands the booth that exhibits historical copies of one of Heinrich Hertz' great inventions that he created at the Polytechnikum Institut in Karlsruhe, 1886-1888.[1] These artifacts, fabricated by the Max Kohl AG company of Chemnitz Germany, probably between the years 1902 and 1914, which were intended for purchase by schools, universities and inventors, closely model Hertz' second successful design for producing a sympathetic spark in a "Resonator."[2]

Hertz constructed this second apparatus pair as "parabolic reflectors," in order to concentrate the signal and better establish the relationship between electromagnetism and visible light rays.[3] He also improved on the distance his original signal traveled, from 9 to 16 meters. Upon relocating to Bonn in 1889 to become Director of that University's *Physikalisches Institut*, Hertz and his students built models of his original apparatus in order to teach future students; also, he could continue his own experiments. By this time, news of his successes had reached the wider world. Sadly, at the young age of 37, Hertz died on January 1, 1894. Today, his original Freiburg inventions may be seen at the Deutsches Museum in Munich. The later models remained in Bonn.

What most students of radio history have in mind is Hertz' first sender, consisting of a battery, a Rühmkorff-style coil and a spark gap apparatus. This inductor attached by wires to each side of the spark gap (in German, *Funkenstrecke*). In turn, it terminated at the center in two small metal spheres spaced .75 cm apart, and from each sphere extended a 150 centimeter-long wire, forming a straight line away from the gap to create a dipole array. At the outer ends of each wire, larger spheres — all bronze — were attached (each 30 cm in diameter), to provide the circuit's capacitance.

Hertz calculated the wavelength produced by this first arrangement at 9 meters. A re-sized array totaling 26 cm achieved a wavelength of 60 cm. Using a large reflective panel of zinc, a very large prism made of hard pitch and a single-direction, close-strung wire screen, he studied the properties of electro-magnetic waves. Using the zinc panel, he was able to measure highs and nulls along the signal path by observing the



AWA Museum exhibit featuring models of H. Hertz' parabolic sender (l.) and receiver (r.); constructed by Max Kohl AG, Leipzig, ca. 1910. Center: contemporary image.

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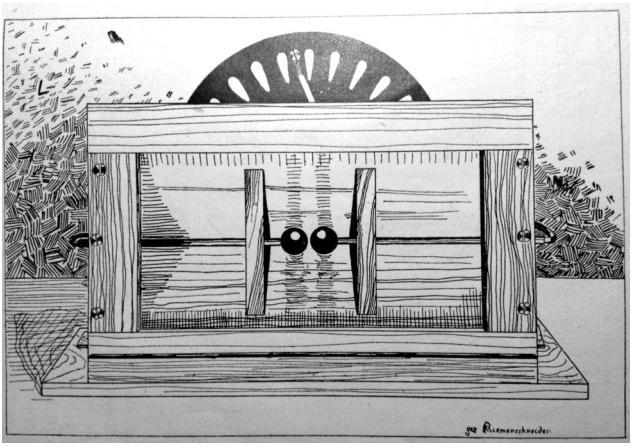
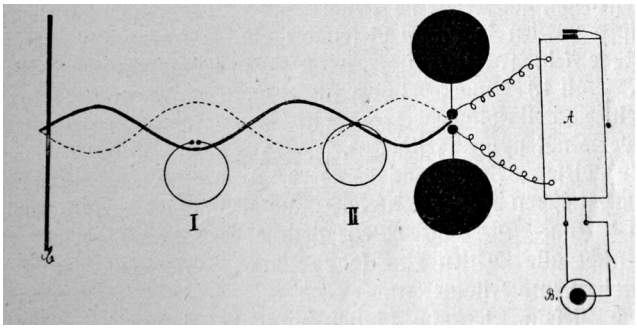


Drawing of a Hertzian parabolic sender, Behind it is an electrostatic generator that supplied the high voltage. From Riemenschneider *(Ref. 12).*



Schematic showing construction of Hertz's original experiment. From Riemenschneider *(Ref. 12).*

presence or absence of the sympathetic spark created in the circular resonator. Ernst Lecher's "Lecher line/s" (1888) also accurately measured standing waves.[4] Hertz' results clearly demonstrated James Clerk Maxwell's differential equations suggesting electromagnetic propagation.[5] He could deflect the electromagnetic waves using the prism, and with the mesh he confirmed that they had polarity. Hertz' dissertation studies in Berlin under Prof. Hermann von Helmholz had already provided him with valuable insights into the properties of inductance and capacitance. His first Freiburg experimental equipment may be viewed on the Internet.[6]

This AWA exhibit includes the hefty Max Kohl Company Catalog that featured many hundreds of mechanical devices for experimentation or general use in many scientific fields of the day.[7] Both Hertz models were available. Image #63 267 shows similar equipment at the price of 69 Marks "for recreating the original Hertz experiments… The spark inductor should have a length of 10 cm." Image #63 268 features "2 parabolic mirrors, one with a Hertz Sender (oscillator), the other with a coherer (resonator)," but "without the spark inductor, the accumulators" (i.e., batteries), or "Leyden" jars (i.e., capacitors). Cost of the parabolic pair alone: 80 Marks. The sender in the Museum has the newer Righi spark gap design, and the receiving parabola uses a coherer, replacing the earlier resonator gap. Understandably, the original Hertz design was updated by Max Kohl to insure greater success for the purchaser who would necessarily have to acquire the remaining items. Clearly, this equipment was intended solely for demonstration and education, not for signal transmission across an appreciable distance.

Books Explaining the Phenomena

A surprising number of books were written between 1900 and 1914 about "Hertzian waves." They represented reports of recent developments, technical handbooks, explanations of the phenomenon for specialists, those for the layperson, and, later on, well-

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researched histories, every one of them a trove of information for today's historian. More than 2,000 significant titles were published up to 1920 in German, English, French and Italian, including more of lesser value. Eugen Nesper's two-volume *Handbook of Wireless Telegraphy and Telephony* (1921), published after World War I is perhaps the best comprehensive reference work available about this early period.[8]

As early as 1906, books described the results of technically minded experimenters and their electrical schematics and then explained how those experiments were conducted. Domenico Mazzotto's book — translated from Italian into German — was one of the first.[9] Although his drawings were relatively few in number and still rudimentary, given the relative difficulty of obtaining information in Italy, he produced information useful for any researcher or experimenter of the day. Mazzotto's rather detailed description of Marconi's ultimate success in 1902, by spanning the Atlantic in both directions from Poldhu in Cornwall to Cape Breton (Canada) and then to Cape Cod, indicates the high estimation that Italians in general placed on Marconi's scientific and business dealings with the British.

Most of those involved in wireless sensed that this was only the beginning of the technology. Mazzotto gives this voice when he concludes: "Astonishing as the advancements in wireless telegraphy have been in the short time since Marconi's pioneering efforts [i.e., 1902-1906! *WH*], still it cannot be denied that the current state of science and technology is a long way from fulfilling all expectations."[10]

The physicist Ernst Ruhmer combined the qualities of experimenter, manufacturer and popularizer of the wireless peripherals. He is especially known for his work in the carrier frequency concept. In his day he was one of the "go to" persons in Berlin for selenium "cells."[11] His cells would, when illuminated, reduce to one-sixtieth the value of their "dark" state electric resistance. By employing a marine beam arc lamp and microphone as the sender (a concept first developed by E. G. Bell and improved by Hermann Theodor Simon), and a selenium cell in the receiver, Ruhmer managed to demonstrate this other form of *wireless* communication for the German Kaiser. Ruhmer's first experiment spanned a distance of 1.5 km. Then he doubled it and later increased the distance to 7 km, despite rain and fog. By 1905 other experimenters had reached a distance of 100 km.

…And the Book To Build It (All)

K. Riemenschneider recounts this event in detail in his *Experiment Book of Wireless Telegraphy and Telephony* (1908), which took place at the Glienicke Bridge.[12] Although it resembled those of his competitors, his book would easily satisfy the practical needs of professors and teachers in German science labs that others did not. Hobbyists were also a target readership. In it the author showed *how* to build several early and contemporary wireless designs.

In 175 drawings and photos, Riemenschneider's wireless schematics emulate those in other books, such as Ernst Ruhmer's, whose work he borrowed, and numerous photos of complete components and their use in the field are taken from the *Gesellschaft für drahtlose Telegraphie*, i.e., Telefunken.

First, the book reviews Heinrich Hertz' early discovery and briefly notes Guglielmo Marconi's efforts to extend the distance that waves could be received. It must be noted that Riemenschneider is loath to give Marconi much credit for his work. Aldolf Slaby and Georg Graf von Arco, Germans both, and Telefunken are rated higher. The author's readers of the year 1908 probably agreed with this estimate.

The book explains and illustrates all elements of both Hertzian constructions: first the chrome-acid battery; spark inductor; primitive spark gap arrangement; and circular resonator. (Instructions for building a Leclanché dry cell are included later.) Second, details of the wooden construction for the parabolas are given, down to the millimeter. Chapter 3 discusses the Branly coherer (*Fritter*), the *Galvanoskop* and the *Righi-Radiator*. Electricity can be generated by the *Elektrisier* — i.e., the *Influenz-*

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maschine. Riemenschneider offers twenty of Hertz' experiments to demonstrate the behavior of the electromagnetic waves; students are encouraged to re-create them.

Marconi's work had become so prominent, that Riemenschneider devotes Chapter 4 to his equipment. Chapter 5 takes up a relatively new dimension in wireless: tuned circuits, rudimentary though they were. Throughout the book, the author returns to each aspect of signal creation, explaining the contributions of notable persons such as Faraday, Feddersen, Branly, Braun, Slaby and many others.

The early sending station at Nauen (northwest of Berlin) is briefly described. One photo reveals the banks of its many tall, thin Leyden jars. The difference between quenched and the *new* unquenched waves is also explained. Today's reader will find the discussions of "wireless" arc-lamp telegraph and voice transmission quite interesting (referenced above). To support this section, a lengthy historical and technical explanation of selenium cells is added. The numerous photos of equipment and installations (towers, antennas and even mule pack mobile stations in Africa) provide a valuable source of information for historians of the early wireless phenomenon.

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11 Ernst Ruhmer, *Neuere elektrophysikalische Erscheinungen*, Berlin, 1902, 162 p. See: https://archive.org/stream/neuereelektroph00ruhmgoog#page/n3/mode/2up

12 Riemenschneider, *Experimentierbuch der drahtlosen Telegraphie und Telephonie nebst Hinweis auf die Technik und Praxis*, Leipzig, Hermann Beyer, 1908, p. 117ff. (The Glienicke Bridge was known as the "bridge of spies" during the Cold War.)

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BOOKS AND LITERATURE

ERIC WENAAS, P.O. BOX 676028, 14813 RANCHO VALENCIA VISTA, RANCHO SANTA FE, CA 92067, E-MAIL: ERIC@CHEZWENAAS.COM

Books to be reviewed in this column should be sent directly to Eric Wenaas at the address above. After review, all such books become a permanent part of The AWA Library, which is available to members for browsing and research.

Sprague Electric: An Electronics Giant's Rise, Fall, and Life after Death *by John L. Sprague. Printed 2015 by CreateSpace Independent Publishing Platform. Pages: 224; 5" x 8"; Paperback $15.95; Kindle edition: subscribers read free, download $9.95.*

"Don't be Vague…ask for Sprague" — a dated but endearing slogan that appeared on the back of the ubiquitous Sprague Products Company catalog circulated to servicemen, amateurs, experimenters and industrial users for many decades during the second half of the twentieth century. The Sprague Products Company was a subsidiary of the Sprague Electric Company, which was the new name of the Sprague Products Company as of April 24, 1944. There cannot be many repairmen, antique wireless enthusiasts or ham radio operators who are not intimately familiar with the orange, blue and white catalog circulated by Sprague, or at the very least, the many Sprague capacitor lines that filled a majority of its pages.

As the title states, this book relates the saga of the rise, fall, and life after the existence of the Sprague Electric Company, which began with the creation of the Sprague Specialties Company in 1926 and ended when the last vestiges of the Sprague Electric Company were sold off in the early 1990s.

While this book recites many historical events occurring between the founding of the company and the divestiture of its division, it is much more than a simple historical account containing facts, figures and dates. It also relates stories about the key decision-makers, details of their personal interactions, and how and why they made the decisions that shaped the destiny of the company. These stories are skillfully related by John Sprague, who was intimately familiar with the events — first as the son of the founder and CEO, Robert Sprague, then as an employee, and later as Sprague's CEO.

Author John Sprague divides the book into three major sections corresponding to the three major historical eras of the company — the early period when the company name was initially Sprague Specialties (1926 to 1944), the creative years when the company was renamed Sprague Electric and joined the solid-state revolution (1944 to the early 1970s), and the period of troubles, the struggle to survive, and the sale of its divisions to other entities (early 1970s to the early 1990s).

Of the many historical events the author recounts, there are several that stand out. Arguably, the most important historical event of all was the invention of a variable condenser that launched the Sprague Specialties Company in the first place. Created by Robert Sprague in his Quincy, MA kitchen, it was a tapped fixed paper condenser with an accompanying tap switch. It was used as a variable tone control in broadcast radio receivers that were all the rage in 1925.

While it is beyond the scope of this review to explain how Sprague's variable condenser worked or why it was unique, the reader may wish to find out by reading the original patent: No. 1,675,831 entitled "Tone-Control Means." The patent, filed by R. C. Sprague on May 29, 1925, can be retrieved from Google Patent Search. It has a very readable explanation of how the

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device was used and why it was a real advance in tone control technology.

The company parlayed the paper and metal-film design of this condenser into the "Midget," a condenser that was half the size of the standard mica condensers offered by other manufacturers of the day, and was much less expensive to manufacture. Sprague was on its way to capturing the lion's share of the condenser market, which became the core business of the company.

In the second section of the book, the author describes what happened after the company decided to branch out from its core business of capacitors and other passive components, and pursued the transistor business. John Sprague writes, "*For Sprague this was a monumental decision, and in the minds of some, a fatal mistake*." While John Sprague never reveals exactly who made the decision, one must assume that it was his father, Robert, who was CEO at the time.

He goes on to explain how the solid-state device business was so different from the more familiar passive component business in terms of management style, manufacturing cost competition, and higher R&D costs. The decision to go into this business ultimately resulted in the decentralization of the management and the formation of essentially two different companies within Sprague Electric. John Sprague apparently spent a good portion of the time while he was CEO addressing this issue because he writes, "*This problem of the two Sprague Electrics was never completely resolved during the remaining life of the company*."

In the third section of the book, Sprague describes a sequence of events that ultimately led to the divestiture of the company's divisions, thus ending the long and colorful history of Sprague Electric as a single entity. These events consisted of a series of takeovers that would have delighted even the most discriminating corporate raider.

It began late in 1976 when the General Cable Corporation made a tender offer for all the outstanding shares of Sprague Electric, a public company since June 1926. According to John Sprague, General Cable had acquired over 95% of the shares by March, 1977, and the company found itself under new management. Sprague Electric flourished as a subsidiary of General Cable, and relations between the executives of the two companies were amicable.

John Sprague rose to the position of CEO of the Sprague subsidiary in December of 1980. Then in early 1981, General Cable announced in its annual report that "*discussions with Penn Central Corporation (PCC) have culminated in an offer by Penn Central to purchase for cash GK common* [General Cable common stock]…*resulting in GK* [General Cable] *becoming a wholly owned subsidiary of PCC*." Sprague recalls, "*Within Sprague Electric there was almost universal shock: Penn Central, the bankrupt railroad company? What did it know about electronic components?*"

Adding insult to injury, Carl H. Lindner, a self-made billionaire and CEO of American Financial Corporation, accumulated sufficient stock to take over control of Penn Central in 1983. He became its chairman of the board, and ultimately he became CEO of Sprague Electric as well. John Sprague remembers that soon after Lindner became chairman of the board, he gave a briefing to the Lindner Board seeking funds for a much-needed expansion and upgrade of its silicon wafer processing facility.

Just before he gave the briefing, one of the directors commented, "*Well gentlemen, we have already spent a lot of money on your company, so I assume that in the future no more will be required*." Upon hearing John Sprague's briefing that the needed improvements for Sprague could not be financed without additional support from the parent company, the director grumbled, "*What a terrible business*!" This comment presaged the divestiture of the Sprague divisions by Penn Central in the early 1990s.

Following the three main divisions of the book is an Epilogue, which is actually in the form of a memoir where John Sprague reflects on experiences and memories of life with his father. John recalls two poignant life events, one involving his father and the

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other involving both. Labor discord in 1970 at Sprague Electric led to a strike lasting more than two months that greatly affected John's father.

John writes, "*I am certain that, at least in his business life, the low point for him was the 1970 ten week strike. Convinced he had made Sprague Electric a good place to work and compensated his employees fairly, he couldn't imagine that they would take such an action, endangering not just the life of the company, but also their own*."

The second poignant moment was an altercation John had with his father. John writes, "*The argument we had over changing to a niche semiconductor strategy was one of the low points of my life. I had to convince the man I loved and respected most in the world, who starting from scratch had built one of the world's most successful passive component companies, that this time he was dead wrong. He only made things much worse by calling me a 'coward'...*"

There is a very noticeable and welcome switch from the third person used in the main body of the book to the first person used in the Epilogue. Use of the first person makes the memoire warmer and more personal, and it is a shame that the entire book was not written in the first person. The repeated use of "John Sprague" instead of "I" in the main body actually makes it feel like the book was written by another person and also makes it more difficult to read.

For example: "*At Lehovic's request, Robert Sprague's son, John Sprague, studied the patent in detail. As he did so he became increasingly excited*." As a reader, I would have preferred: "At Lehovic's request, I studied the patent in detail, and as I did so, I became increasingly excited." Since many of the factual events appearing in the Epilogue are also mentioned in the main body of the book, and since much of the material in main body is in fact a series of memoirs, the Epilogue and the main body could have been integrated and the first person could have been used throughout the book.

First or third person aside, the book is very interesting, quite readable and filled with information on the history and inner workings of the Sprague Electric Company that cannot be found elsewhere. For those who are familiar with the Sprague name by using either its passive components or its solid-state devices, this book will augment your knowledge and understanding of the company. I highly recommend it to anyone interested in the history of radio.

It is interesting to note that this book was produced in partnership with the IEEE History Center (IHC) Press. The IHC Press works with authors to publish books on the history of electrical- and computing-related technologies, and also works with Amazon.com to publish handsome print-on-demand paperback books and Kindle versions. Prospective authors can learn about IHC Press publishing initiatives by visiting the IHC website at http://ethw.org/Archives:History_Center_Press_Book_Author_Submission_Guidelines.

About the Author

Eric P. Wenaas received his bachelor's and master's degree in electrical engineering from Purdue University, and his Ph.D. in Interdisciplinary Studies from the State University of New York (SUNY) at Buffalo. He was employed by Jaycor, a defense contractor, and specialized in nuclear and electromagnetic radiation effects on electronic systems. He is a published author, a member of the Antique Wireless Association (AWA), and writes a book review column for the quarterly *AWA Journal* and *AWA Gateway*.

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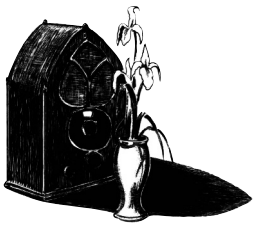
RECENT RADIO, TV AND ENTERTAINER OBITUARIES



COMPILED BY **CHARLES S. GRIFFEN, W1GYR**
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Note: When known, the date of death is indicated in parenthesis.

VAN ALEXANDER, 100, (7-19-15) arranger and band leader. Alexander arranged and co-composed *A-Tisket, A-Tasket* for Chick Webb and Ella Fitzgerald. The song spent over two months as the country's number one song in 1938. That same year Alexander organized his own band and signed with RCA Records the following year. He moved to Hollywood in 1945 and began working in film and recording studios. Alexander composed music for movies featuring Mickey Rooney [*Baby Face Nelson* (1957) and *Andy Hardy Comes Home* (1958)] and wrote scores for two of Joan Crawford's later films, [*Straight Jacket* (1964) and *I Saw What You Did* (1965]).] He also composed music for dozens of television shows, including *Hazel*, *Bewitched*, and *I Dream of Jeannie.* Alexander was also Chief Arranger for Dean Martin's variety show (1965-1974). He finally gave up his band to concentrate on composing and arranging for television and films. Born Alexander Van Vliet Feldman, he received a lifetime achievement award from the American Society of Composers, Authors and Publishers in 2002.

JUDY CARNE, 76, (9-3-15) actress. Carne achieved fame popularizing the catchphrase "Sock it to me" [splash!] on *Rowan & Martin's Laugh-In* (NBC Television 1968-1970). Other TV cast credits are *Fair Exchange* (CBS 1962-1963), *The Baileys of Balboa* (CBS 1964-1965), *Love on a Rooftop* (ABC 1966-1971) and *Kraft Music Hall Presents Sandler & Young* (NBC 1969). Carne also made guest appearances on such shows as *Bonanza* (NBC), *Gunsmoke* (CBS), *The Ed Sullivan Show* (CBS) and *The Tonight Show* (NBC) with Johnny Carson. Carne was born Joyce Audrey Botterill in England and began performing on the television series *Danger Man* (1961) and episodes of *The Rag Trade* (1961), a BBC sitcom. She moved to the United States in 1962. In the late 1960s and 1970s Carne made appearances on the musical and comedy stage, including *Cabaret* and *Absurd Person Singular*, *There's a Girl in My Soup* and *Blithe Spirit*.

NATALIE COLE, 65, (12-31-15) vocalist. Cole, the daughter of jazz singer Nat King Cole, earned a Grammy Award when she re-recorded her father's hit *Unforgettable – With Love,* with him on the track. It was album of the year and sold some 14 million copies. Some of her other hits included *That Sunday That Summer*, *Too Young* and *Mona Lisa*. Cole also hosted the television talent show *Big Break* (Syndicated 1990) and appeared on *It's Showtime at the Apollo* (Syndicated 1987). The PBS music program *Unforgettable with Love: Natalie Cole Sings the Songs of Nat King Cole* earned an Emmy Award in 1992. The father-daughter duet, *When I Fall in Love*, won a 1996 Grammy for best pop collaboration with vocals, and the album *Still Unforgettable* won for best traditional pop vocal album of 2008.

BETSY DRAKE, 92, (10-27-15) actress. Drake made her RKO Pictures debut in *Every Girl Should Be Married* (1948) opposite Gary Grant whom she married in 1949. Other film credits are *Dancing in the Dark* (1949) with William Powell, *Pretty Baby* (1950) with Dennis Morgan and *Room for One More* (1952). She was born Betsy Gordon Drake in Paris and attended a theater school in Washington, D.C. Later Drake found work in New York City as a Conover model and Broadway understudy. There she and Grant starred on an NBC radio show, *Mr. & Mrs. Blandings* (1951). In 1947 she was given a lead role in the London produc-

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tion of *Deep Are the Roots*. Drake later give up acting to write, under the name Betsy Drake Grant and work as Director of Psychodrama at UCLA's Neuropsychiatric Institute. She earned a Master in Education degree from Harvard University.

JOHN L. ELLINGER, 91, (2-7-15) executive. Ellinger was the General Manger of WJMJ (FM) in Hartford, CT for more than 35 years, leaving the position in 2008. The non-commercial radio station was founded by Archbishop John F. Whealon in 1976 as a way to spread the Gospel through inspiring messages and easy-listening music. He also managed or consulted for WNHC (AM & TV) New Haven, CT; WHAY (AM) Hartford, CT; WDRC (AM) Hartford, CT; WPLR (FM), New Haven, CT; WICC (AM) Bridgeport, CT; WPOP (AM) Hartford, CT; WMMW (AM) Meriden, CT; WNAB (AM) Bridgeport, CT and WATR (AM) Waterbury, CT. In 1961 Ellinger served as Chairman of the Connecticut Broadcasters Association. At the time he was the youngest person to serve in that capacity.

BUDDY EMMONS, 78, (7-21-15) pedal steel guitarist. Emmons was an innovator who brought the pedal steel guitar into country, jazz and rock genres. Called "the Big E," he was known for his flashy string work and dazzling instrumentals such as *Raising the Dickens* (1955) and *Four Wheel Drive* (1957). Emmons was a popular accompanist and recorded with Ray Charles, Bob Dylan, Arlo Guthrie, Linda Ronstadt, Rosemary Clooney and the Henry Mancini Orchestra. He toured with Ray Price's Cherokee Cowboys and Ernest Tubb's Texas Troubadours. Emmons created new designs for the instrument, including his signature model, the Emmons Guitar in 1963. It was sold through his Emmons Guitar Company. He began playing with bands when he was 14 and studied at the Hawaiian Conservancy of Music in South Bend, IN. Emmons was inducted into the Steel Guitar Hall of Fame in 1981.

DR. JAMES L. FLANAGAN, 89, (8-25-15) acoustical engineer. Flanagan was Director of Information Principles Research at AT&T's Bell Laboratories at the time of his retirement in 1990. He…"was a pioneer in the field of acoustics, envisioning and providing the technical foundation for speech recognition, teleconferencing, MP3 music files and the more efficient digital transmission of human conversation." The latter topic was discussed in an article, "Computers That Talk and Listen: Man-Machine Communication by Voice" published in the *Proceedings of the IEEE* in 1976. Flanagan was granted or shared in about 50 patents. He earned his doctorate from the Massachusetts Institute of Technology before joining the Labs in 1956. Later he was a Professor and Vice President for Research at Rutgers University. During WWII Flanagan served in the U.S. Army Air Force working to perfect signal scrambling and radar.

ANTON GUITANO, 65, (12-8-15) executive. Guitano was the Chief Operating Officer of CBS's Local Media from 2009 until he retired in 2015. He was responsible for overseeing the financial and operational success of the network's television and radio stations as well as the stations' websites and other digital platforms. Guitano joined the firm in 1978 and rose through the ranks from Financial Comptroller for the CBS Television Network to Senior Executive Vice President, Operations, for CBS Radio before being promoted into his final position. Guitano also served as CBS's representative on the FCC's Advisory Committee for Communications in the Digital Age. Leslie Moonves, CBS Corporation President-Chief Executive Officer said, "It was my privilege to work with Anton for many years…). He loved this company and provided a huge example to all who worked with him." Guitano began his career at Price Waterhouse.

VIRGINIA GUNN, 66, (12-7-15) television personality. Gunn was co-host of a daily evening-feature program, *PM Magazine*, on WAGA (TV) in Atlanta from the 1970s until the final show in December 1982. She began her career on the station as a popular weathercaster. Ken Cook, a former WAGA meteorologist, said she was

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"young, bubbly, energetic and full of life… This is a big loss for her family, her many friends and the state of Georgia." When Gunn retired she moved to St. Simon Island, GA and began a career in politics. She was elected a Glynn County Commissioner representing St. Simon Island and became a crusader of environmental issues. She lost her re-election bid in 1996. After 21 years on the island, Gunn and her husband, author William Diehl, moved back to the Atlanta area. After his death in 2006 she returned to St. Simon Island.

MILO HAMILTON, 88, (9-17-15) sportscaster. Many will remember Hamilton for calling Henry Aaron's 715th home run for the Braves in Atlanta on April 8, 1974 which broke the 714 run record set by Babe Ruth. After graduation from college in 1949 he began sportscasting by calling football and basketball games for the Iowa Hawkeyes. Hamilton was the play-by-play announcer for the Houston Astros from 1985 through the 2012 season. Born Leland Milo Hamilton, he got his first job calling baseball games for the St. Louis Browns in 1953, their final season before relocating to Baltimore. Hamilton remained in St. Louis for a season to call Cardinals games and then left to cover the Chicago Cubs, the Chicago White Sox, the Braves, the Pittsburgh Pirates and the Cubs again. In 1992 he accepted the Ford C. Frick Award from the National Baseball Hall of Fame. Hamilton served in the U.S. Navy during WWII as a broadcaster on Armed Forces Radio.

KITTY KALLEN, 94, (1-7-16) vocalist. Known as "Pretty Kitty Kallen" she toured and recorded with many of the big bands of the 1940s, including Artie Shaw, Jimmy Dorsey and Harry James. When singing with Dorsey's band, she and Bob Eberly scored a hit with *Besame Mucho* as well as *When They Ask About You* and *They're Either Too Young or Too Old*. She achieved some of her biggest hits as a solo artist with *My Heart Belongs to Daddy* (1946) and *Little Things Mean a Lot* (1954). She and Buddy DeVito were featured vocalists with Harry James when he substituted for *The Danny Kaye Show* on CBS Radio during the summer of 1945. Kallen also starred on *The Colgate Comedy Hour* television variety show and made guest appearances. She also performed at nightclubs, including the Copacabana in New York City and the Palladium in London. Kallen began singing in public at 12 and performed on *The Children's Hour* on WCAU (AM) in Philadelphia.

ANNE KEEFE, 90, (12-29-15) radio and television host. Keefe began her career on WHAM (AM) in Rochester, NY hosting *True Stories of the New York State Police* and then joined WHAM (TV) when it went on the air in 1948. There she hosted episodes of *Romper Room*, *Anne's Attic*, *Dialing for Dollars* and worked in the news room. Keefe also worked as the News Director of WROC (TV) in 1969. In 1976 she stopped in St. Louis en route to an interview for a television station in Kansas City. Some friends alerted Bob Hyland, Manager of KMOX (AM) who interviewed Keefe and hired her. She spent the rest of her career with KMOX. Joan Beuckman met Keefe when she came to KMOX and said, "She was the first woman in talk radio in the St. Louis area." Further, "She was smart, well-educated, glib, quick-witted and very, very funny." Keefe was also a panelist on Channel 9's *Donnybrook* program beginning in 1988. When she considered that talk radio had become too coarse, she retired. Keefe returned to live in Webster, NY in 2011.

JOAN LESLIE, 90, (10-12-15) actress. Leslie performed in over thirty films with many of the leading men of the 1940s. Some of her most notable roles came before she was 18 — *Sergeant York* (1941) starring Gary Cooper, *High Sierra* (1941) opposite Humphrey Bogart, *Yankee Doodle Dandy* (1942) with James Cagney and *The Sky's the Limit* (1943) starring Fred Astaire. Leslie's career plummeted after a contract dispute with Jack Warner (Warner Bros.). Born Joan Agnes Brodel, she and her two sisters helped support the family performing in small-town theater circuits. They made their way to New York City where they found work in nightclubs and finally screen tests. Joan dropped out of show business for marriage and to raise two daugh-

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ters. Later she made guest appearances on TV shows (*Murder, She Wrote*), made TV movies and volunteered at a home for unwed mothers.

MARTIN MILNER, 83, (9-6-15) actor. Milner enjoyed success in the television show *Route 66* (CBS 1960-1964) in the role of Tod Stiles. He found adventure with Buz Murdock (George Maharis) traveling along Route 66 in his Corvette. Milner's second hit was in the police drama *Adam 12* (NBC 1968-1975) playing Officer Pete Malley. The show was produced by Jack Webb. Milner's other TV cast credits were *Kraft Television Theatre* (NBC 1949), *The Stu Erwin Show* (ABC 1950-1955), *The Life of Riley* (NBC 1957-1958) and *Swiss Family Robinson* (ABC 1975-1976). He also made guest appearances on *The Sheriff of Cochise* and *Telephone Time.* Some of Milner's film credits were *Sands of Iwo Jima* (1949), *Operation Pacific* (1951)*, Mister Roberts* (1955) and *Gunfight at the O.K. Corral* (1957) starring Burt Lancaster. Early in his career he worked in films and made his debut in *Life With Father* (1947) featuring William Powell and Irene Dunne. Milner served in the U.S. Army during WWII.

JOSEPH "JOE" MOORE, JR., 72, (12-9-15) journalist. Moore served as a news anchor, News Director or Station Manager at WJHG (TV) in Panama City, FL from 1971 until he retired on May 21, 2014. News Director Donna Bell said, "He was not bothered by the unpredictable nature of television news. His average work day was 12 hours and he rarely took a day off. He was the first to show up, last to leave and commonly worked weekends. But this was not because he was a workaholic. Moore did it because he loved the work." He came to Panama City in 1967 to help launch WFSY (FM) and then was hired by WJHG. Moore began his broadcasting career in Birmingham, AL as a teenager and later attended the University of Alabama School of Radio & Television.

MAUREEN O'HARA, 95, (10-24-15) actress. O'Hara was a red-haired, green-eyed heroine who became known as the "queen of Technicolor," the motion picture process in vogue during the 1940s and 1950s. She came to this country and starred in many films – *The Hunchback of Notre Dame* (1939), *How Green Was My Valley* (1941), *Miracle on 34th Street* (1947), *Against All Flags* (1952) opposite Errol Flynn, *The Spanish Main* (1945) with Paul Henreid, *The Quiet Man* (1952) with John Wayne, *The Wings of Eagles* (1957), *Our Man in Havana* (1959) and *Big Jake* (1971). Born Maureen FitzSimons in Ireland, she studied at the Ena Mary Burke School of Drama and Elocution in Dublin. O'Hara's career took her from the theater to British films, including: *My Irish Molly* (1938), *Kicking the Moon Around* (1938) and J*amaica* (1939). She made a comeback in *Only the Lonely* (1991) and her last television film was *The Last Dance* (2000).

REV. EVERETT C. PARKER, 102, (9-17-15) broadcast reformer. Parker founded and was Director of the United Church of Christ's Office of Communications from 1954 until retirement in 1983. He spearheaded the civil rights movement to hold radio and television stations accountable for providing balanced programming and for hiring minorities and women. In 1964 he petitioned the FCC to deny WLBT (TV) in Jackson, MS a license renewal for failing to serve the public interest as required by law. An appeal was filed and in 1966 Judge Warren E. Burger ruled the FCC's record in the case was "beyond repair" and ordered WLBT's license revoked. Burger wrote, "After nearly five decades the broadcast industry does not seem to have grasped the simple fact that a broadcast license is a public trust subject to termination for breach of duty." Earlier Parker was General Manager of WJBW (AM) in New Orleans (1936 to 1937), wrote books and taught at Yale Divinity School.

NORMAN C. PICKERING, 99, (11-18-15) engineer, inventor and musician. Pickering invented the Pickering pickup and cartridge for use in broadcast and recording studios. These inventions to reduce sound distortion and help records last longer were soon purchased by high fidelity enthusiasts.

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To satisfy the demand Pickering formed Pickering & Company to manufacture these products. He also studied the acoustics of stringed instruments, developed vibration control designs for the Boeing 707s and 747s and created an ultrasound diagnostic technique for the eyes. Pickering played the violin and French horn. In 1940 he joined C.G. Conn in Elkhart, IN where he designed musical instruments. During WWII he worked at a Sperry Research Laboratory on Long Island. Pickering was one of the founders of The Audio Engineering Society in 1948.

WAYNE ROGERS, 82, (12-31-15) actor and executive. Rogers played the part of Captain "Trapper" John McIntyre in the television situation comedy *M*A*S*H* (CBS 1972-1975). In the comedy series, he and Hawkeye Pierce (Alan Alda) were combat surgeons during the Korean War and were noted for their antics and improper military behavior. Rogers was a cast member of *Stagecoach West* (ABC 1960-1961), *City of Angels* (NBC 1976), *House Calls* (CBS 1979-1982) and made guest appearances. He also starred in the film *Ghosts of Mississippi* (1996) and was a successful theatrical producer. Born William Wayne McMillan Rogers III, he served as a navigator in the U.S. Navy before beginning an acting career in New York City in the 1950s. Besides acting, Rogers was a successful business and real estate investor. He was Chairman of Wayne M. Rogers & Co., an investment strategy firm, and frequently appeared on Fox Business Network's *Cashin' In*.

PHIL WOODS, 83, (9-29-15) saxophonist. Woods played the alto saxophone alongside many legendary musicians, including Dizzy Gillespie, Benny Goodman, Quincy Jones and Buddy Rich. He toured the Soviet Union with Benny Goodman band in 1962. Woods received four Grammy Awards: the first for the 1975 album *Images*, made with Michel Legrand, and the last for the 1983 album *At the Vanguard*, featuring the Phil Woods Quintet. He was also featured on Billy Joel's 1977 hit *Just the Way You Are*, a Grammy Award-winning ballad. Woods studied clarinet at The Julliard School in New York City and upon graduation became a prolific performer and recording artist. Woods was named a National Endowment for the Arts Jazz Master in 2007. He announced his retirement plans less than a month before his death.

Information for this column was obtained from *The Boston Globe*, *The Catholic Transcript, The Complete Directory of Prime Time Network and Cable TV Shows* 1946-Present (9th edition), *The Democrat & Chronicle*, *The Economist*, *The Encyclopedia of Jazz*, *The Hartford Courant*, *The New Haven Register, On the Air: The Encyclopedia of Old-Time Radio*, *The Washington Post*, and
www.fox5atlanta.com,
www.imdb.com,
www.jacksonville.com,
www.latimes.com,
www.nbcnews.com,
www.newsherald.com,
www.stltoday.com,
www.tvnewscheck.com,
www.variety.com,
www.waynerogers.com,
www.wikipedia.com, and
www.wjhg.com.

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Some Obscure Tubemakers

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The tube industry included a galaxy of small manufacturers outside the GE-RCA-Sylvania-Amperex-Kenrad constellation. Their products still show up in the market and in collections. However, the companies themselves are often mysterious. This article is a synopsis of some firms that were once important to the towns where they were located. The focus is on producers of small- and medium-sized glass power tubes in the 1940s and later. Receiving tubes are a different matter; covering them would take a book, after one accounted for all the custom-rebranders, box-swappers, and other secondary agents. Microwave tubes — mostly radar parts — are yet another whole topic, covered well by the 2008 book *The Tube Guys* by Norman H. Pond.

Some of these operations are hard to trace because they did little advertising. Firms that did most of their sales on Government contracts were un-inclined to promote their wares in print, even through professional media like *Electronics* or the *IRE Proceedings*. Some of them did advertise, but only on a generic or "image" basis.

Likewise, product literature from some of them is hard to find, even simple line cards. The vendors had their sales departments work on a "bid" basis with the military purchasing authorities, looking toward orders in bulk. Most of the market was the Army and Navy, although smaller quantities went to agencies like the Civil Aeronautics Agency (later FAA) or Lighthouse Service.

Most of these operations were second-sources for tubes developed by others. This was particularly true of products that had been introduced by Eitel-McCullough and Heintz & Kaufman.

General Electronics

This company had a plant at 101 Hazel St. in the old industrial town of Paterson, NJ, and a sales office in New York City. The founder was Delbert Replogle, a tube engineer who had worked for Raytheon, De Forest (as chief engineer), and Hygrade Sylvania (also as chief engineer for power tubes). He had written articles in media like *Radio Engineering* and *Electronics*. His name was heavily associated with the introduction of graphite-anode power tubes in the mid-'30s.

The company appeared in 1942, an expedient time to start up, given the massive demand for power tubes resulting from the war. The product line was mostly second-sourcing. It used a certain amount of hype in its advertising: "In all phases of electronics — induction heating, broadcasting, or medical — General Electronics tubes have earned a reputation for extra-long life." Well ("not so fast"), their products weren't

GENERAL ELECTRONICS INC.

on the FCC's list of tubes approved for broadcast transmitters!

Most of the smaller companies applied vanity prefixes to their type numbers. In this case, Replogle used "DR," as in "DR-809." The military agencies assigned identifiers to their suppliers beginning with "C-for-contract." General Electronics got "CDR," yielding military-qualified parts identified like the "JAN-CDR-250TH."

For a time the company supplied small CRTs of sizes from three to eight inches in

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diameter. There was also a line of strobe and flash tubes. General Electronics never registered a new type with the Radio Manufacturers Association, but produced types better known as RCA, Eimac, Western Electric, or Amperex products. Examples are the 100TH, 807, 813, and 857B.

The firm retrenched during the great postwar slump, becoming incorporated in 1948. It was controlled for a while by the Hycon Mfg. Co. of Pasadena, CA; then merged with Arcturus Electronics, Inc., a remnant of the old Arcturus Radio Tube Company. At that point (1952) Arcturus built a 40-person plant to rebuild black-and-white picture tubes. It lost out to vigorous competition and declared bankruptcy.

General emerged from the bankruptcy intact. It suffered a serious fire in the Paterson plant in 1959. After a series of changes in ownership, the company acquired control of United Electronics (1963) via a stock swap, and moved operations down to Newark. It had some friction with Eimac over payment of royalties for use of the latter's patents on tube designs, specifically involving the 3C24 VHF triode as sold to the FAA and Air Force. The suit was settled in Eimac's favor in 1964.

Replogle was a serious tube collector. He was a friend of the major collector Howard Schrader, and had figured in the latter's mounting a large display of early tubes at the annual Institute of Radio Engineers show in 1956. He had also acquired the tube collection of Joseph d'Agostino, executive assistant to David Sarnoff at RCA. He put it on display at the Paterson plant, but lost it in the 1959 fire.

The "General Electronics" brand disappeared in the late 1960s. Its product line was aging, being mainly "commodity" glass, internal-anode types like 250THs and 4PR60s, and ran about 90% government business.

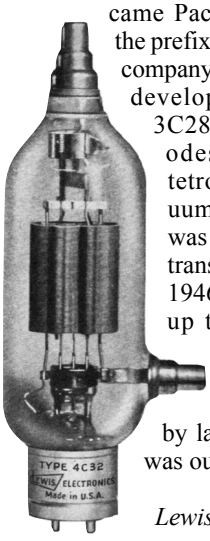
Lewis Electronics, Lewis & Kaufman, Marshall Electronics

The small town of Los Gatos, west of San Jose, California, was home to a string of tubemaking companies. It all started with the National Radio Tube Company of San Francisco, founded by Garrett Lewis, W6EX, in 1927. It made mercury rectifiers (the famous "Rectobulb" line) and "50-watt" triodes, and rebuilt water-cooled types. It moved south in the late 1930s, becoming Lewis Electronics, concentrating on original manufacture.

It became a subsidiary of the Aireon Manufacturing Company of Kansas City about 1945. The latter had diversified from aircraft parts into electronics: railroad "induction" communications gear, Cinaudagraph loudspeakers, ground-station radios, and juke boxes.

As the wartime demand eased, Lewis in mid-1945 advertised a stock of vacuum rectifiers (3B24, 217A, 217C, 878,) and power tubes (3C24, 4E27, 833A), and offered to make tubes on a private-branded basis. It became a sales agent of the Defense Supply Corporation before the war's end, offering surplus power tubes and CRTs from 16 Lyndon Ave. in Los Gatos.

In its Aireon phase, the prefix "AT" appeared on a few of Lewis' tubes (AT-340, for example). In mid-1946 the company became Pacific Electronics, and the prefix changed to "PE." The company tried to boost sales by developing new tubes: the 3C28 and 4C32 VHF triodes, 3D23 and 4D23 tetrodes, and 6B21 vacuum rectifier. The 4C32 was promoted for amateur transmitters (*QST*, March 1946): a pair would take up to a kilowatt in the five-meter band. These tubes were not big sellers, and by late 1947 the company was out of business.



Lewis 4C32.

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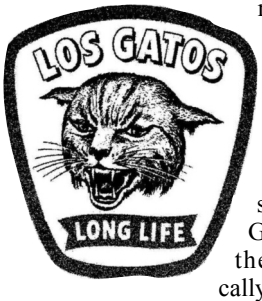
Lewis & Kaufman

In early 1949 Lewis reorganized the company by partnering with Jack Kaufman, who had co-founded Heintz & Kaufman. The new firm was Lewis & Kaufman, Inc. In October, 1950 the new company received a patent license from Eimac, and contracted to make 500 35T triodes and 2000 25Ts to be Eimac-branded.

A press release in *Radio-Television Service Dealer* for January 1951 announced that L & K had bought the entire capital stock of Taylor Tubes Inc. It's not clear how long this ownership lasted, Taylor becoming a subsidiary of Continental Electric in Illinois about 1956. In 1952 L & K was sold to a reactivated Pacific Electronics and became Lewis & Kaufman Ltd.

As of 1954, after a couple cycles of corporate reorganization, the company was a division of the International Glass Corporation. Its products were familiar tubes of military interest: the 100TH, 4E27A, 719A, and so on. The marketing slogan was "Los Gatos," symbolic of the tubes theoretically having nine lives.



Kaufman left in 1957. The firm became "inactive," then restarted as a division of Monogram Precision Industries by merger with the Cascade Research division of Monogram. The Cascade Research name turns up on tubes today, although the name is more closely associated with microwave ferrite components. The "Lewis & Kaufman" and "Los Gatos" brands were sold to Russell Industries of Lynbrook, NY for use on rebranded tubes — receiving and special-purpose — from other manufacturers.

Meanwhile the Lewis & Kaufman Electronic Corporation was separated from the parent, housed at 657 University Ave. in Los Gatos. It gave up manufacture, selling from stock. Sales were insubstantial: according to Eimac patent-licensing records, only $7898 for 1961 and $16,048 for 1962.

Marshall Electronics

In 1963, Marshall Industries of Newark, NJ bought the inventory and other assets of L & K. Operating as Marshall Electronics, it restarted production of 3C24s, 4D21s, and other tubes for military renewal use, and apparently rebranded others' tubes as well. After continuing losses, Marshall closed the plant and moved production east.

Central Electronic Sales

The Central Sales & Manufacturing Corporation of Denville, NJ was another little-known tubemaker. Formed under that name about 1954, it first advertised the 4C28 VHF power triode. This tube was used in a transponder for the SHORAN (Short Range Navigation) precision-bombing system. The company name became Central Electronic Manufacturers, Inc., a division of the Nuclear Corporation of America. (This name is not to be confused with Central Electronics, the classic maker of early single-sideband amateur transmitters!

It promoted a line of radar transmit-receive tubes, vacuum rectifiers, power triodes, ion gauges, and test equipment, as well as waveguide components. The staff at the time was about 60 people. Soon after, it introduced argon noise-generator tubes for measuring the noise performance of radar receivers.

The company carried out development of some unique special tubes. An example is the XD-6, a liquid-cooled power diode of 1957 for use as a series charging diode in radar modulators and rated for 16 kilowatts' dissipation.

Central XD-6 from QST *March, 1946.*

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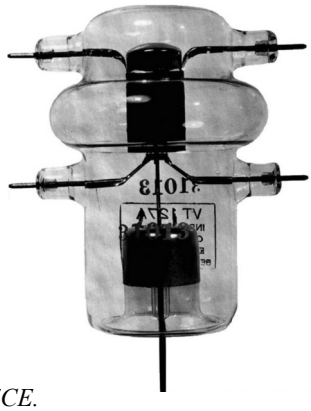
The product line seems to have shrunk to only the noise tubes by about 1964. However, it is suspected, from the physical design, that Central was the maker of a line of 12 other XD-numbered radar tubes catalogued in 1965 by Fairchild Du Mont Laboratories (successor to Du Mont Laboratories).

Industrial & Communication Electronics

This was a "one-war wonder" in Belmont, California, about 15 miles south of San Francisco. It was a partnership started in 1941 by Charles Litton, a major tube engineer-consultant at the time, and two experienced associates. The company is known mainly from a short series of advertisements in the professional press, and from a few military tubes that have survived.



VT127CE.
Courtesy History San Jose.

The amateur market had vanished "for the duration," and the company had no product on the FCC broadcast list. Types being promoted in early 1945 were copies of Eimac developments: the 100TH and 250TH triodes, VS-2 vacuum switch; and VC12, VC25, VC50, and VC100 vacuum capacitors. A second-sourcing of the Heintz & Kaufman 257B pentode was included.

A major item of production was another Eimac innovation, the VT-127 triode known mainly for its use in the Signal Corps SCR-268 antiaircraft radar. However, in early 1945 the Army began surplusing-out the obsolete SCR-268, so that meant the end of VT-127 purchases. ICE kept a brave "we'll be here" tone in its ads and realigned itself toward a modernized line of vacuum capacitors. The next year it had plans to make an early variable vacuum cap, but disappeared from the industry and liquidated in 1949.

Electronic Enterprises

This company appeared in 1943, a start-up in Newark, "Tubetown USA," at 65-67 Seventh Avenue. The initial advertised offerings were rectifiers: the 371B, 836, 866A, 872A, and 8020. By the end of the year the company claimed to have glass "power and transmitting" tubes in its line. The ads stopped in December, 1945.

The "vanity" prefix on the company's type numbers was, not surprisingly, "EE." So its version of the Amperex HF-200 was the EE-200. The Radio Manufacturers Association "source code" (545) for its tubes remained in effect between 1949 and 1976.

Electronic Enterprises had been the sole American maker of the Royal Air Force VU111 rectifier, used in Canadian-built radars bought by the Signal Corps. It made 17,999 of them. It introduced a few innovations in rectifiers late in the war and afterward: the 2BT high-voltage tube for projection-TV use, the 3B27, and the 5695 mercury type.

The line as of about 1960 comprised some Eimac-oids (100TH, 250TH, 250R), other aging classics (811A, 812A, 8005, EE300), and some hydrogen thyratrons for use as radar modulators. Surviving products include the JAN-CDZ-274B rectifier, their version of the over-revered Western Electric 274B.

The company lasted until at least 1971. Its fate is unclear: part may have been merged into the ITT Electron Devices operation across town, and part may have been bought by a firm named Keystone Electronics.

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AWA 2016 WORLD CONVENTION

RIT INN AND CONFERENCE CENTER, ROCHESTER, NY • AUGUST 17-20, 2016

DUAL THEMES: WIRELESS BEFORE BROADCASTING AND ZENITH RADIO

I would like to extend my warmest welcome to the 55th annual AWA Convention. This year will truly be an exciting one. In addition to the other attractions, our Museum will have expanded operating hours to make it more accessible during the convention. Convention registration is open to the general public and Flea Market sellers must be registered. However, **new for 2016**, unregistered walk-in customers are welcome. The Convention will be held at the Rochester Institute of Technology Conference Center, Henrietta NY, which is offering a **special convention rate of $99.00** for a single or double. For info or reservations, you must call directly to the hotel at (585) 359-1800. The Conference Center has restaurant facilities, and we are offering a **special convention dining event every evening**. Advance registration for these events is **STRONGLY** encouraged. The Wednesday evening bash is not to be missed because the pizza is on us! I am most proud of our presentation list for this year. I can tell you that I wouldn't miss this Convention even if I were not the Chairman. As always, we have a mix of our talented regulars with some equally talented newcomers. And remember, I am always looking for interesting ideas for the future. **Another new for 2016: The Museum will be open Tuesday, August 16, from 10 a.m. to 3 p.m., Wednesday, August 17, from 5 p.m. to 7 p.m., and Saturday, August 20, from 1 p.m. to 5 p.m. during the convention week** to allow you a chance to see the expanded Museum with many new exhibits. This has been requested by convention attendees and we owe a note of thanks to the Museum volunteer staff that is making it possible.The Conference Center is reached from Exit 46 of the New York State Thruway (I-90): take I-390 north to NY 253 west, to NY 15 south. For visitors arriving by air, the location is about seven miles from the airport. There is shuttle service 6 a.m.-11 p.m. **Specify the RIT Conference Center -— not the RIT college campus.** See the rest of this convention preview as well as the "Convention Doings" section of the Membership News column in this issue for more information. If you have any questions or concerns please contact me personally by email or telephone.

Roy Wildermuth, W2IT
AWA World Convention Chairperson
585-899-6703, AWAmilitary@gmail.com

Programs and Overall Event Chair
ROY WILDERMUTH

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CHRIS BACON

Finance
STAN AVERY
BARNEY AND JANE WOOTERS

Ladies Luncheon
FELICIA KREUZER

Entertainment
BOB HOBDAY

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Auction
BRUCE ROLOSON

Hotel Relations
BRUCE ROLOSON
BOB HOBDAY

Registration
DAN AND SUE WATERSTRAAT

Website, Registration, Event IT
RICHARD NEIDICH

Directions to the new museum complex (6925 Route 5, Bloomfield, NY 14469) from the hotel: Turn right (south) on Rt. 15. At Avon (9.5 mi.), go left (east) on RTS. 5 & 20. At Bloomfield (16 mi.) pass the Holloway House restaurant and continue east on 5 & 20 approximately one mile. The museum complex will be on your right just past the intersection of Route 444.

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Highlights of the Annual Convention

We have come a long way from being a "radio meet" to being a World Convention. But when you review the highlights below, you will agree that the title is well deserved.

Food, Glorious Food – 3 Days Of It

- At the Pizza Dance Party FREE FREE FREE
- At the Special Guests Luncheon. Don't forget it — an AWA tradition!
- At the AWA Banquet — PRIME RIB!

Our New Free-Wheeling Flea Market

A $30.00 flat rate buys all the real estate you want. Drive in, pick your spaces and set up. First come, first served. All the spaces you want for $30.00 total. And walk-in buyers need not be registered at the convention.

Film Presentation

"Western Union" with Randolph Scott and Dean Jagger.

Ham Radio Contacts

A special events station will be on the air as W2AN courtesy of the Rochester DX Association. This will be their 7th year with us. This year we will be using a flex radio.

Partial list of presentations

Story of VOA.....Bart Lee
The Teletype.....Duncan Brown
The Moscow-Washington Hotwire and the
AWA Russian Teleprinter .....Ray Wildermuth
Amelia Earhardt's W/E 13-C Transmitter .....Brian Harrison
Juvenile Books on Wireless.....Mike Adams
Just Before Radio .....Bill Jaker
Formation of Western Union.....Bruce Roloson
Modern Radio Update .....Paul Jason
Moonlight Restorations Seminar .....Robert Lozier
Special Events Station W2AN .....Rochester DX Association
AWA Members Meeting

2016 Old Equipment Contest

By Geoffrey Bourne and Chris Bacon, Contest Coordinators

As in the past, this year's Old Time Equipment Contest Categories are divided into two major groups: Theme and Standard. The Theme categories reflect the two main themes of this year's AWA Annual Conference, *Wireless Before Radio* and *The Zenith Corporation*. We will also have all the regular standard categories, special craftsmanship categories, and the named awards

"Wireless Before Radio" refers to the development of wireless communications prior to the start of regularly scheduled broadcasting, which most authorities set in 1922. Starting with James Clerk Maxwell's equations, which predicted the existence of electromagnetic waves in 1871, and Heinrich Hertz' experiments in 1886, which proved the validity of Maxwell's work, many scientists, researchers, and experimenters developed the body of science known as wireless.

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Guglielmo Marconi was the first to take the experiments out of the laboratory and make a commercially successful message for hire service with them, pushing the technology into practical directions. Along the way, the amateur radio fraternity made sometimes surprising advances and provided a stream of enthusiastic and well prepared individuals to work in, develop, and promote the new industry. Finally, World War One provided a major impetus and funding for the development of new tubes and technology which would pave the way for the emergence of broadcasting. Each of these aspects of early wireless has a category below.

Zenith was certainly one of the longest lived and best known of all U.S. consumer electronics companies, and one of only a few companies that were in the consumer electronics manufacturing business continuously from the pre-broadcast days of wireless to personal computers. During its manufacturing years Zenith made numerous radio and television receivers which are highly appreciated by collectors today for quality, style, and technical achievement.

Zenith invested heavily in research, and produced innumerable technological innovations along the way. Just a few of Zenith's "firsts" include miniaturized tube and transistor hearing aids, AFC circuits for FM table radios, gated beam detectors, the Phasitron FM modulator, portable multi-band shortwave radios, wireless remote controls for TVs, rectangular three-gun color CRTs, the first solid state multi-band AM/SW portable radio, the first transistor AM/FM portable radio, FM multiplex stereo, the first phone-controlled pay TV service, TVs with built-in closed captioning, and the 8VSB modulation system now used for over-the-air DTV.

Zenith got its start in 1918 when two radio amateurs, Karl Hassel and Ralph H.G. Matthews, started building radios on a kitchen table in Chicago for sale to other radio amateurs. They originally named the business Chicago Radio Laboratory, but used "Z-Nith" as their trademark. It came from their amateur radio station, 9ZN. Entrepreneur and explorer Commander Eugene F. McDonald Jr. joined the team as businessman, and the Zenith Radio Corporation was founded in 1923. The company would continue to operate under that name until 1984, when it was changed to Zenith Electronics Corporation in a reorganization.

Wireless Before Radio Theme Categories

1. EARLY EXPERIMENTAL WIRELESS, 1886-1922
   Any artifacts, documentation, or displays pertaining to the pioneers of wireless, whether famous or relatively unknown.

2. COMMERCIAL WIRELESS
   Documentation, displays, and artifacts from Marconi, deForest, or their competitors in the commercial wireless message business.

3. EARLY AMATEUR WIRELESS
   Documentation, displays, and artifacts from the early days of amateur radio.

4. WORLD WAR ONE WIRELESS, 1914-1919
   Documentation, displays, and artifacts from the military development of wireless during WWI.

Zenith Radio Corporation Theme Categories

1. THE CHICAGO RADIO LABORATORY, 1918-1922
   Any radios, documentation, and other artifacts from Zenith's "Z-Nith" days, when they catered mostly to amateurs and experimenters, would be welcome in this category.

2. ZENITH EMERGES, 1923-1929
   Zenith's first broadcast receivers were similar in design and concept to the amateur models. However Zenith realized, sooner than many other companies, that a radio to be featured in most customers' living rooms should look like — and be — high quality furniture. But Zenith's philosophy of offering high performance and high quality, which had attracted the amateur enthusiasts, was not changed for the broadcast receivers.

A. BATTERY SETS
Any Zenith battery powered broadcast receiver from the 1920s may be entered in this category.

B. AC SETS
With improved technology that became available from 1925 onward, Zenith began offering radios which could run on utility power. Many were large, heavy consoles which were needed to house the early power supplies, but some smaller models were made as well.

3. THE DEPRESSION YEARS, 1930-1936
Just as all U.S. companies were impacted by the Great Depression, Zenith had to make major changes to its product lineup in order to survive. Many of its previous customers could no longer afford large, highly crafted furniture consoles but there was a market for smaller, less ostentatious, quality radios. During these years, Zenith became renowned for its engineering as the latest tubes, components, and design techniques were used to produce superior radios at marketable prices.

A. CATHEDRALS, TOMBSTONES, AND OTHER STYLES
Originally known as "mantle radios," these early 1930s radios featured smaller and lighter chassis than previously used, but were housed in wood cabinets.

B. CONSOLES
Having established itself as a high quality brand, Zenith continued to build very elaborate consoles, such as the *Stratosphere*, for window dressing in its showrooms and for buyers who could afford to purchase them. Few of these models were sold, so they are scarce and highly sought after by collectors today.

4. THE PREWAR YEARS, 1937-1942
Since the worst years of the Depression had passed and the economy had begun to move again, Zenith realized that there would be growing numbers of customers who could afford new radios again, and were ready to replace their outdated or worn out sets. But many customers' tastes and fancies had changed; instead of trying to match the heavy old furniture already in customers' houses, there was demand for new modernistic styles and features. At the same time, Zenith realized that many of its competitors had not survived the economic downturn and there was more room to experiment with lower priced offerings.

A. BLACK DIAL CONSOLES AND CHAIRSIDES
Included in the new styling Zenith introduced were larger, easier to read dials. Zenith turned this into a dramatic statement with their black dial in use occupied most of the dial space. Most had tuning indicator tubes and mechanical bandspread. Belt driven motors were incorporated to make it easier to get from one end of the dial to the other.

B. BLACK DIAL TOMBSTONES AND TABLE RADIOS
Zenith did not limit its black dial styling to consoles; it was applied to tombstone and table models as well. One such model with a particular iconic style, the seven-tube 7-S-232, was featured on the 1970s TV show *The Waltons*, making it an instant hit with nostalgia buffs and collectors even if it was not historically correct (the show was set in the first few years of the Great Depression but that radio wasn't produced until 1938!) Zenith also put 9- and 12- tube chassis in the same cabinet, all of which are known as "Zenith Waltons" today.

C. FARM RADIOS AND THE WINCHARGER
By the late 1930s, American cities were completely electrified, but the same could not be said of many rural areas. However, with the proliferation of more powerful broadcast stations, good reception day and night was possible in most locations. With the acquisition of the Wincharger Corporation, Zenith was able to offer complete farm radio systems including DC powered radios, storage batteries, and tower mounted, wind driven generators to keep the batteries charged.

D. EARLY TELEVISION
Although Eugene McDonald and David Sarnoff were often bitter rivals, and Zenith avoided RCA tubes, parts, and patents as much as possible, McDonald recognized the importance of television and pushed his engineers to prepare for its arrival. Zenith started experimental TV broadcasting in Chicago in 1931 and put what is

often credited as the first all-electronic TV station, W9XZV, on the air in February 1939. As Zenith TV equipment from the prewar era was experimental and for demonstration, very little made it into the hands of collectors. Any prewar Zenith TV equipment, artifacts, and documentation is welcome in this category.

5. ZENITH AND WORLD WAR 2
   Zenith increased its productive capacity during World War Two as orders poured in from the military for bomb fuses and other electronic devices. Large numbers of Wireless Set No. 19, a British-designed short wave and VHF transceiver that was a mainstay in allied tanks and other heavy vehicles, were produced by Zenith. A Zenith-built Wireless Set 19 with all its accessories would make a nice entry, but the category is open to all Zenith military items.

6. THE TRANS-OCEANIC
   Eugene McDonald was an avid yachtsman and asked his engineers for a portable multiband shortwave radio with performance comparable to the larger receivers. Numerous prototypes were tested by McDonald personally and rejected before he settled on what became the 7G605 "Clipper," named for the sailboat graphic on the original models. The 7G605 was released in June, 1942 and was only available briefly before civilian sales ended due to the wartime restrictions. Production continued, however, as the military bought the sets for troop entertainment receivers, and following the war, restyled and re-engineered versions were introduced. The Trans-Oceanic was perhaps the most iconic line of portable radios of all time and remained in production until 1981.
   A. TUBE TRANS-OCEANICS
      Any Trans-Oceanic model made or introduced between 1942 and 1957 may be entered.
   B. SOLID STATE TRANS-OCEANICS
      Eugene McDonald's last project at Zenith was the Royal 1000, the first solid state Trans-Oceanic. Introduced in 1957, it was a completely new design using germanium transistors. It was replaced by the Royal 3000 in 1962 which added FM. In 1968, the Royal 7000 was introduced which had an entirely new look, VHF weather band, switchable selectivity, and BFO. In 1979, the final Trans-Oceanic, the R7000, was introduced. It had continuous tuning from 150 kHz to 30 MHz and added the VHF aviation band. It was also the first Trans-Oceanic to have modular circuit boards rather than a hand-wired chassis.

7. THE POSTWAR YEARS, 1950-1980
   Although Zenith had been a major supplier of parts and equipment to the military during World War Two, it decided to refocus itself on consumer electronics after the war ended. It saw RCA's reluctance to get involved with FM as a golden opportunity and heartily embraced both FM broadcasting and its inventor, Edwin Howard Armstrong. When the FCC indicated that it was going to move FM out of its original frequency band to its present band, rendering existing FM radios useless, Zenith developed "obsolescence proof" circuitry that could be used on either band without greatly increasing the cost of an AM/FM radio — a major feat in 1946. As a result, they dominated the AM/FM radio market for many years

   But Zenith knew that the future was in television, and using the ame high quality, high technology principles that had guided their earlier years, they became the top selling brand of black-and-white TVs in the 1950s and 60s. Zenith was involved in experimental color TV since 1941 and demonstrated compatible color in front of the FCC in 1953, being one of only three companies to do so using a picture tube of its own manufacture. Zenith also became the first company to produce a rectangular three-gun color picture tube. But Zenith decided not to offer color TV sets to the public until they felt the system was sufficiently perfected, which occurred in 1961.
   A. RADIOS AND PHONOS
      In this category, we hope to capture some of the huge variety of AM and AM/FM radios and radio-phono combos that Zenith made. The range of Zenith's production in this field was huge, from simple five tube AM table radios to elaborate home entertainment centers. Zenith continued producing stereo systems — including some quadraphonic models — until the late 1970s.

B. TRANSISTOR RADIOS
As a leading proponent of new technology, Zenith embraced transistors and mastered the art of using them at high frequencies. It introduced the first multiband solid state shortwave portable radio, and the first transistorized AM/FM transistor portable (the Royal 2000). Many varieties of transistor radios, big and small, were made.

C. BLACK AND WHITE TV 1940-1960
Zenith introduced its first consumer TV models with 11-inch "Great Circle" screens — now referred to as "portholes" by collectors — in 1948. The sets were of advanced design and included the ability to have UHF strips fitted in their turret tuners in advance of UHF TV broadcasting. Until black-and-white TV sales were surpassed by color in the 1970s, Zenith dominated the black-and-white TV market.

D. COLOR TV, 1953-1963
Zenith had been performing experimental color TV broadcasting in color sets starting in 1953, but it did not offer color sets to consumers until 1961. When it did, it used its own circuitry, making it the only company at that time which did not use the RCA design.

8. OTHER PRODUCTS
Over the years, Zenith produced innumerable products and accessories related to its main activities. Zenith entered the hearing aid field in 1939 with the table top "Ravox" which used conventional receiving tubes and an AC power supply. This was followed in 1942 by the first wearable model, the A2A "Radionic," which used subminiature tubes and battery power. With components developed during WW2, Zenith introduced the still smaller "Miniature 75" in 1949 before developing the first practical transistorized hearing aid in 1952. Zenith vacuum tubes, batteries, and radio and TV antennas were available at many electronics dealers.

9. DOCUMENTATION
Over the decades, Zenith produced a great many documents about itself and its products, and much has been written by others. This category is divided into two areas, one for corporate and technical documentation and the other for advertising and sales helps.

A. COMPANY HISTORY AND INFORMATION
Biographies of noted personalities, who shaped and worked at Zenith, engineering documents, technical information bulletins, etc.

B. ADVERTISING AND CUSTOMER DOCUMENTS
Customer-oriented documentary artifacts, magazine ads, dealer displays, give-aways, descriptions of Zenith sponsored radio and television programs, and customer instruction books are examples of the entries in this category.

Standard Contest Categories

10. PASSIVE RECEIVERS
Any detecting device, not including vacuum tubes or solid state amplifying devices whose purpose is to convert radio energy into intelligent signals.

11. 1920S SUPERHET RECEIVERS
Any receiver which employees the super heterodyne circuit and is from the 1920s can be entered here.

12. 1920S TUNED RF RECEIVERS.
During the 20s the TRF set was one of the most widely produced sets on the market. It was sold in kit form, factory assembled or built from scratch from a plan in a magazine. This is where you would enter a Freshman Masterpiece or an AK 20 and so on.

13. 1920S REGENERATIVE AND REFLEXED RECEIVERS
Many manufacturers employed different circuits to improve the.receiving capabilities of their radios. The Regen and Reflex are among the many circuits that were used. Bring in a fine example of this type of radio.

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14. CATHEDRALS, TOMBSTONES AND CONSOLES 1930S AND 1940S
    This is probably the most recognized type of antique radio around. Just about everyone remembers someone in their family having one of these. So bring in that Philco 90 or any other cathedral, tombstone or console radio. We will split the category if enough entries show up.

15. MILITARY RADIO
    A. PRE WWII (EARLY TELEGRAPH, SPARK WIRELESS, ETC.)
    B. WWII 1941-1945
    C. POST WWII 1946-1960
    D. VIETNAM ERA
    E. MISC.

16. PORTABLE RADIOS
    Any battery operated portable radio may be entered in this category. We may split the category into decades so a transistor set does not compete with a 1920s tube set. So bring in an early portable radio from the 20s to a Zenith Transoceanic from the 50s or 60s.

17. SPEAKERS
    A. HORN
       Any sound reproduction device can be entered here as long as it employs a horn or bell for sound amplification.
    B. CONE
       When radio sets obtained greater power output levels the magnetic speaker unit was designed with large surface areas for better sound reproduction. There are many fine examples of this type of speaker i.e. Tower Adventurer, Western Electric, etc.

18. TEST EQUIPMENT
    There were many makers of test gear. A short list would include Supreme, Superior, Hickok, Weston, Read-Rite, General Radio, Simpson, Rider, RCA, and too many others to list. So surprise us, bring in the unusual or the common.

19. TUBES
    In this category you can display a single tube or a collection. There should be a common theme with the display, such as historical significance, technological breakthrough, etc. The display should tell a story.

20. TELEVISION
    A. MECHANICAL
       Bring in a scanning disk or a mirror screw set. It can be original or a modern replica.
    B. ELECTRONIC
       This is the category to enter any television set. Can be black-and-white or color. Kit or factory.

21. INTERNATIONAL RADIO
    A. PRE-1945
       Bring in any radio or artifact produced before 1945 from any country outside the U.S.
    B. POST-1945
       Bring in any radio or artifact produced after 1945 from any country outside the U.S.

22. NOVELTY RADIO
    Bring in a nice lamp radio or any other radio made to look like something else.
    A. TUBE
    B. TRANSISTOR

The Amateur Radio Categories

23. SPARK TRANSMITTERS AND ARTIFACTS
    Do not hesitate to enter a major piece of spark equipment if you think it is rare or historically significant.

24. VACUUM TUBE TRANSMITTERS AND RECEIVERS.
    Some of the sets for this class are old, some not so old, most home-built, while the predominant entries have been amateur-constructed, commercial equipment is welcome. This year we are going to split the category in two.
    A. HOME BREW
    B. COMMERCIAL

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The Craftsman Categories

25. RESTORATION OF APPEARANCE.
The purpose of this category is to display examples of rebuilding and refinishing the cabinets and containers that were used to house radio receivers. There is no requirement for a particular kind or size of set to be entered. A description of the work done will be considered an important part of the entry. The critical element is the appearance of the radio, including woodwork, escutcheons, dials, knobs and other visual details.

26. RESTORATION OF OPERATION.
This is the category for those craftsmen who artfully substitute modern components for old failures. The new electrolytic in the old can is an excellent example. Another is the transistorized tube. Perhaps the replacement of pot-metal parts by silver-gray-colored epoxy castings has been accomplished by one of us. If so, please bring in the set that incorporates that restoration. An entry should be accompanied by documentation showing the basis of the update that preserves the quality of the original.

27. NEW OR REBUILT.
Previously we have encouraged entries that showed the conference attendees how substitutions and reconstructions would provide vital parts or pieces. We also encouraged craftsmen who had made an old function come alive again to bring their work for review. Do you remember the Federal receiver that was entered several years ago and the operating Marconi coherer detector from the year before last? We want to continue that tradition so bring in your retrospective designs and your reconstructions. There is no requirement for particular devices or circuits.

28. OPEN CATEGORY
Enter any item that does not fit into the listed categories.

The Contest Awards

Elle Craftsman
Given in memory of Bruce Elle to a builder of a high-quality radio receiver of an old or new type.

Matlack Transmitter
Given for excellence in constructing or restoring transmitting equipment.

Ralph O. Williams Display
Recognizes the informational value and quality of an exhibit in the contest at the AWA conference.

Thompson Best of Show
Awarded in honor of early amateur Eunice Thompson, W1MPP, for the top entry in the Old Equipment Contest at the Annual Conference.

People's Choice
Awarded to the entry that receives the most favorable votes from attendees and visitors to the contest. All entries including displays are eligible for this award.

Contest Coordinators: Geoffrey Bourne and Chris Bacon

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BY MICHAEL W. MARINARO, WN1M

AMATEUR RADIO AT THE 1933 WORLD'S FAIR

During the hundred year period from 1833 to 1933, the city of Chicago had grown from a frontier town to the fourth largest city in the world. Visionary civic and business leaders decided to commemorate the city's Century of Progress by staging a modern World's Fair focused on technology. And amateur radio enthusiasts wanted to be part of the show.

The site available for the Fair was 427 acres of newly reclaimed land stretching three and a half miles along the shore of Lake Michigan south of the city. This area included Northerly Island and several lagoons, providing a diverse terrain. It was intended that the theme of scientific progress be developed not only through exhibits but also by the buildings which housed them.

The Fair's architecture was to project the application of advanced design concepts to the effective display of scientific exhibits. The result was a unique community of avant-garde buildings designed in what was termed *Moderne* architecture.

An Amateur Council comprised of affiliated area radio clubs began to prepare for the 1933 World's Fair a year prior to its opening. The planners envisioned a large exhibit displaying and interpreting various facets of amateur radio for the public. The almost twenty year old American Radio Relay League supported and endorsed the Council in its effort to present the first ever large scale public presentation of the achievements and progress of amateur radio. The Council set out to make an impressive demonstration, but such plans are not always easily transformed into reality particularly when financial and political forces do not cooperate.

The United States was in the early stages of a depression; A quarter of the nation's labor force was out of work and a third of its banks were closed. The international political climate was unstable, with totalitarian regimes in Europe raising fears of further economic perils and world war.

However, the principal fair organizers persisted, raising $10 million in bonds for the nonprofit enterprise the day before the stock market crash of October 29, 1929. They advocated that the fair would counter the impact of the depression and raise the hopes of the citizens of the city, the U.S. and the world. They would use the very idea of progress as a tool to generate optimism. And it was optimism which drove the Amateur Council to work out a method by which to finance their vision.

The Council contracted to lease two thousand square feet of exhibition space and persuaded twenty-five vendors to sublease space for individual displays. Vendors such as Burgess Battery, RCA, and E.F. Johnson helped pay the rent, making it possible for the remaining space to be devoted to amateur radio. Fair officials persuaded those manufacturers who did not intend to erect distinct buildings to join together by industry and collectively stage their exhibits in one building.

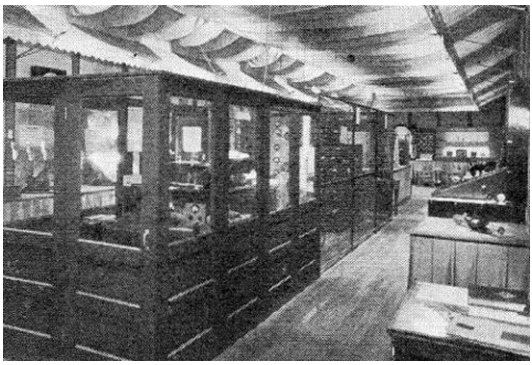
This cooperative concept resulted in the creation of a number of individual industry exhibition buildings, such as those devoted to dairy, travel, transport and agriculture. However, the major corporations of the radio and wired communications industries could not agree to participate in the same building. Accordingly, a Communications Building was created ostensibly to house radio and telecommunications exhibits. As it turned out this building was misnamed; it should have been called the Telephone

E-MAIL WN1M@MSN.COM

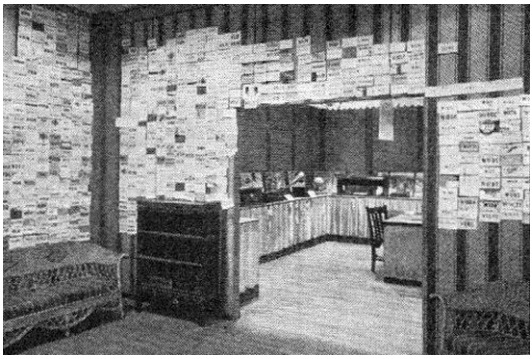
Building, since it was dominated by AT&T and the Bell System. A distinct Radio Building was not created, and potential exhibitors took space in the Electrical building or elsewhere.

The amateurs acquired their space on the second floor of the Travel and Transport Building, which was a startling futuristic structure with a suspended dome. The dome, suspended by a intricate cable system from exterior towers, was 125 feet high and 200 feet across — creating what was claimed to be the largest unobstructed area under roof and the first architectural application of the suspension bridge principle of support.

The amateurs were joined there by exhibits of ships, planes, automobiles and trains. The 2,000 square foot space was subdivided to suit the needs of the amateur radio exhibit and the 25 sub vendors. The displays of the vendors were set out on long counters bordering the four sides of the space. Some of these vendors survive to the present day. They include the following in addition to those mentioned previously:



A typical transmitter cubicle and a corner of the exhibit area.



The club room's walls were papered with the QSL cards of visiting ham who stopped by to socialize.

- American Radio Relay League
- Littlefuse Laboratories
- P.R. Malloy & Company
- National Carbon Company
- National Company
- Ohmite Manufacturing Company
- Raytheon Production Corporation
- Standard Transformer Corporation

The central area was occupied by two operating stations. The transmitters in these stations were built by the Technical Committee of the Radio Amateur Council, utilizing circuit designs from the American Radio Relay League "Radio Amateur's Handbook." The objective was to provide simplicity and functionality. The first four stages of each RF portion of each transmitter were identical, utilizing Raytheon type 46 tubes. The primary station, with the call letters W9USA, operated on 40 and 20 meter CW. It utilized an additional fifth buffer stage employing RCA Type UV211 tube driving four RCA type UV 852 tubes in parallel — push pull producing 1000 watts output.

The second station, with the call letters W9USB, operated on 80 meter phone and CW. This transmitter utilized the four buffer stages using type 46 tubes driving a final amplifier with two RCA type UV 211 tubes in parallel–push pull providing 400 watts output. The Class B modulation system for this transmitter was comprised of two type UX 250 tubes in push pull exciting two RCA type UV203A tubes modulating the final tubes.

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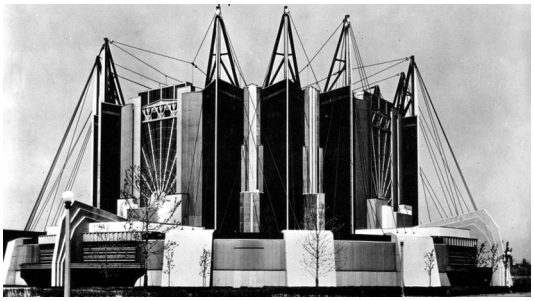
The stations were fitted with National and McMurdo Silver receivers. Later a 5-meter, AM, crystal controlled transmitter was added to the installation. The design utilized three frequency doubling stages to arrive at 56 mc and two type 46 final tubes in parallel which were class B modulated. This transmitter was designed by Dave Elam, W9FPP and built by Art Kraatz, W9HPX and Ralph Johnson of the Illinois Ham Club.



The amateur radio demonstrations were on the second floor of the futuristic Travel and Transport Building.

During the five months that the first Fair station was active, operations were conducted 21 hours daily (but not between 2 a.m. and 5 a.m.). The stations were a link in the National Traffic System, handling system traffic and the messages generated by visitors at the exhibit. A total of 10,500 messages were generated by the visitors. During this period more than 4,000 amateurs from all corners of the earth signed the registration book, including such illustrious personages as Hiram Percy Maxim, W1AW and Senatore Guglielmo Marconi.

In addition, exhibitor McMurdo Silver displayed a 50 watt, crystal controlled AM transmitter as part of a small household amateur radio station that would look good in a living room. This arrangement appeared adjacent to the area where historical radio apparatus was presented. Some of this equipment dated back to the beginning days of wireless and included these significant pieces:

- First high frequency receiver used by the U.S. Navy.
- Zenith receiver used during 1925 MacMillan Arctic Expedition.
- Replicas of the receiver and transmitter used on Byrd Antarctic Expedition.
- DeForest Audion detector unit — one of the first tube receivers.
- Complete 1/4 KW panel spark transmitter used prior to 1923.
- A loose coupler tuner from 1920.

Visiting amateurs were able to relax in the comfortably furnished "club" room adjoining the history exhibit and make and renew acquaintances. The walls of the room became papered with the QSL cards of the hobbyists who had stopped by. All properly licensed amateurs were permitted to operate the stations when conditions were favorable and the stations were not engaged in traffic work. This was a memorable experience for the radio men who participated. Souvenir QSL cards gained a prominent place in many a home radio shack.

During the period August 3 through 5 an ARRL National Convention was held at the Fair. The 740 delegates that attended were able to individually view the significant features of the Fair. In addition, specially conducted tours were arranged which brought the delegates to the displays throughout the Fair that were of particular interest to amateurs.

The discussions at the technical sessions centered on the recent progress and development of radio technology, particularly in the usage of the short waves. Many illustrious radio experts spoke at the various sessions and other gatherings including Don Wallace, W6AM, John Reinartz, W1QP, Art Collins, W0CXX, of the Collins Radio Company, L.A. Hammarlund of the Hammarlund Manufacturing Company, McMurdo Silver, and James Millen of the National Company.

ARRL attendees included Kenneth B. Warner, A.A. Hebert, Clinton B.Desoto, and toastmaster Fred Schnell who intro-

duced President Hiram Percy Maxim at the principal banquet. Maxim spoke of amateur radio's progress and his vision of the future including intergalactic communications. Maxim presented Boyd Phelps W2BP-W9BP with a gold medal for his work in developing the short waves.

A highlight of the convention was the World's Championship Code Speed Contest. Some 300 delegates participated in this two-day event. Accuracy was the objective in copying five letter code groups in the eight speed classes ranging from eight words per minute to the maximum speed capable of reasonable copy.

The winner's silver cup was awarded to Joseph W. Chaplin, a radio operator of Press Wireless, Inc. of New York. Chaplin copied the word groups sent at 57.3 words per minute with only 11 errors out of a permissible 14 establishing him as the new champion. 1432 characters in 286 + 2/5 five letter word groups had been sent.

The runner up was the now dethroned Theodore R. McElroy, formerly operator with Western Union and the Associated Press, who copied at 54.1 words per minute, the next lower speed range, with eight errors. McElroy had held the record at 56.5 words per minute with one error on a three minute run for 11 years.

It was not practical for the amateurs to accurately record the number of visitors to their exhibit. However, by comparing spot counts with daily gate figures they interpolated that 2% of Fair attendees passed through the radio show portals. Based on a total gate figure of 22.3 million attendees this would indicate that 446,000 people visited the radio exhibit. Quite a impressive showing for the amateurs! However, it was not satisfactory to the Fair operators, who had bonds to pay off. An attendance of 60 million was required for the Fair to break even. So it was determined to reopen the Fair for the Spring, Summer and Fall of 1934.

A sensational highlight of the closing of the 1933 Fair was the arrival of the German airship *Graf Zeppelin* on October 26, 1933. The 776 foot craft circled the Fair and the city at low altitude for two hours, landed nearby for a few minutes at Curtiss-Wright airport and then departed for Akron signaling the upcoming closure of the first season in four days. This was only one of the firsts that the Fair created.

Of course Amateur Radio reopened on April 26, 1934 in the same space, but remodeled and redecorated. The equipment and exhibits were basically the same except that an operating spark gap transmitter was added. Visitors were invited to complete a message form. The message was then transmitted by spark to the modern CW station at the end of the room. The message was there typed out on a "Souvenir Radiogram" form and presented to the visitor. Ultimately the message was delivered via the National Traffic System.

Gate figures for the second Fair came to 16.5 million bringing the total attendance to nearly 39 million. Utilizing the amateur's rule of thumb, the Amateur Radio Exhibit was visited by approximately three quarters of a million visitors over two years! A sensational triumph for the fledging fraternity. Other U.S. based World's Fairs with amateur radio exhibits followed the Chicago event:

- 1939 New York, "The World of Tomorrow," W2USA.
- 1939 San Francisco, "The Golden Gate International Exposition", W6USA.
- 1962 Seattle, "The Century 21 Exposition," K7USA.
- 1964 New York, "Peace through Understanding," K2US.

And finally—

- 1984, New Orleans, "The Louisiana World Exposition," K5WF.

Unfortunately the last fair declared bankruptcy before the event ended due to low attendance. Apparently fairs had become less interesting to the public as theme parks, national parks, and other attractions became popular. Exhibitors have become reluctant to risk the great sums necessary to mount a modern fair.

However, on a positive note, local amateur radio exhibits at county and state fairs and similar events have continued to attract

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public attention. These smaller events surely are deserving of support. In addition some emphasis might be placed on devoting portions of our National and Division conventions to public exhibits and promoting public attendance.

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BY MERRILL BANCOFT

THE CAMPBELL ELECTRIC COMPANY

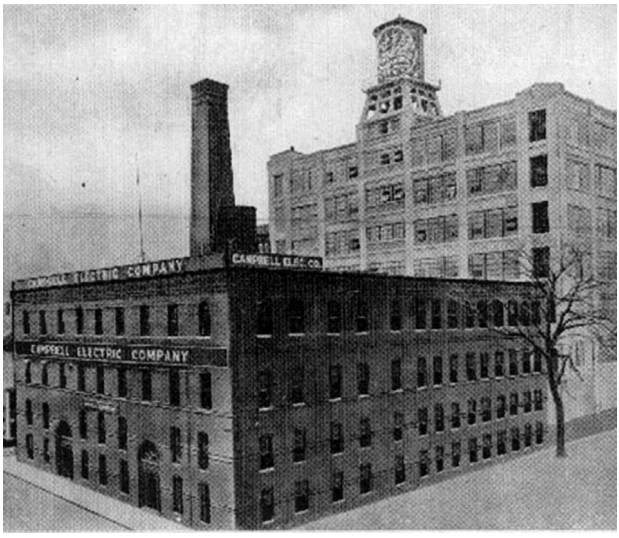
The early 1920s saw its share of entrepreneurs seeking to capitalize on the growing radio business. Many were unable to keep up with the latest design improvements because of a lack of tooling, facilities, knowledge or imagination and the absence of appropriate facilities for streamlined production. However some companies were able to make a reasonably smooth transition to this relative hot new industry. One example is Atwater Kent, which had the engineering staff and production expertise that enabled it to capitalize on the new industry and eventually become one of the leaders in the field.

My collecting interests, on the other hand, have always involved the smaller businesses which made one or two models, and either went back to their non-radio product line or gave up the ghost entirely.

The story of the Campbell Electric Company of Lynn Massachusetts is unique in that it had the tools, engineering know how and production line, but produced radios for just a very brief time during the radio boom of 1922.

Brothers Charles E. and Fred R. Campbell established the Campbell Electric Company in Lynn Massachusetts in 1900-1. Their products included mostly large apparatus, such as x-ray equipment, for use in the medical field. Charles, who was born in Lynn in 1881, had been interested in electric apparatus since he was nine years old. Availing itself of Charles' inventive expertise the company won the only award given to an American manufacturer at the Red Cross conference in Washington in 1912 and also at the Panama-Pacific exposition at San Francisco in 1915.

Paraphrasing an article in the *Lynn Daily Item* of August 1917: Charles E. Campbell, president of the Campbell Electric Company, has been granted a patent of revolutionary importance on a x-ray system which he has invented. This invention promises to do for medical and surgical diagnosis what the telephone did for communication. Worked out and perfected over many years, the system will allow the x-ray work to be performed by nurses and orderlies, freeing the trained diagnosticians to perform their own expert tasks. The article went on to state the numerous advantages of this new device over existing apparatus.



The Campbell Plant in Lynn, MA.

Fred R. Campbell took care of the business side of the partnership. He was a treasurer of several compa-

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nies and director of two Lynn banks. He also held memberships in at least six different lodges. The brothers' skills evidently complimented each other quite nicely.

Campbell Electric made several interesting and innovative pieces of apparatus. One of the first was a heavy duty time switch which could control such high powered items as electric signs and street lights. Other products included diathermy apparatus, high frequency coils to treat blood pressure, and a "High Frequency Treatment Chair" which looks like an electric chair (which I guess it was). I expect there were more. Incidentally some of this apparatus can be seen on a web page at:

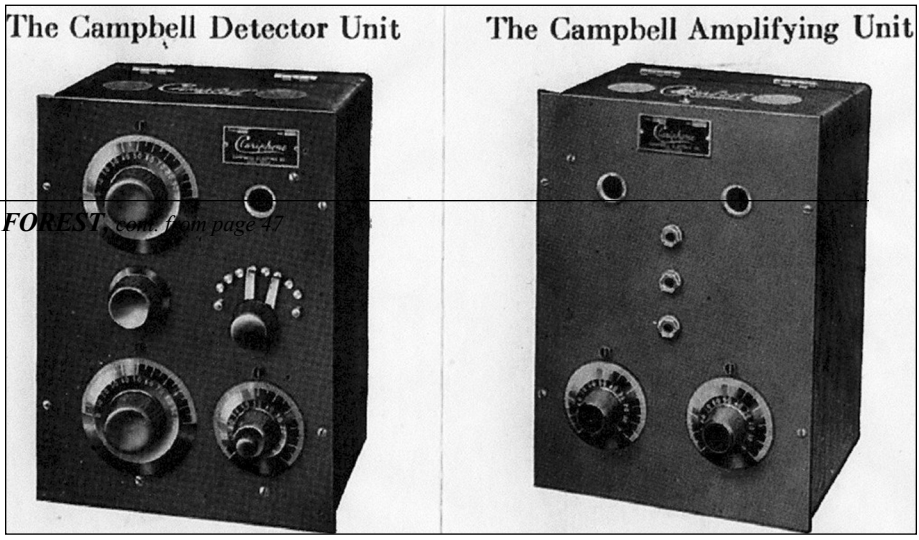
www.electrotherapymuseum.com

The Campbell factory was located at Central Square in Lynn, but outgrew the location and moved into a six-story factory on Steward street.

The Canadian Wireless and Electric brochure included pictures of the Campbell sets.

All right, what does all this have to do with Radio? I have seen no mention anywhere about their brief entry into the radio market beyond two or three pieces of paper evidence.

My recent acquisition of a 65 page book describing the Boston Radio Exhibition of May 1922 has a list of exhibitors, among which is a Campbell Electric Company advertisement of the two pieces I have in my collection but with no pictures. A more recent find at a paper show was a color brochure/handout distributed by Canadian Wireless and Elec-

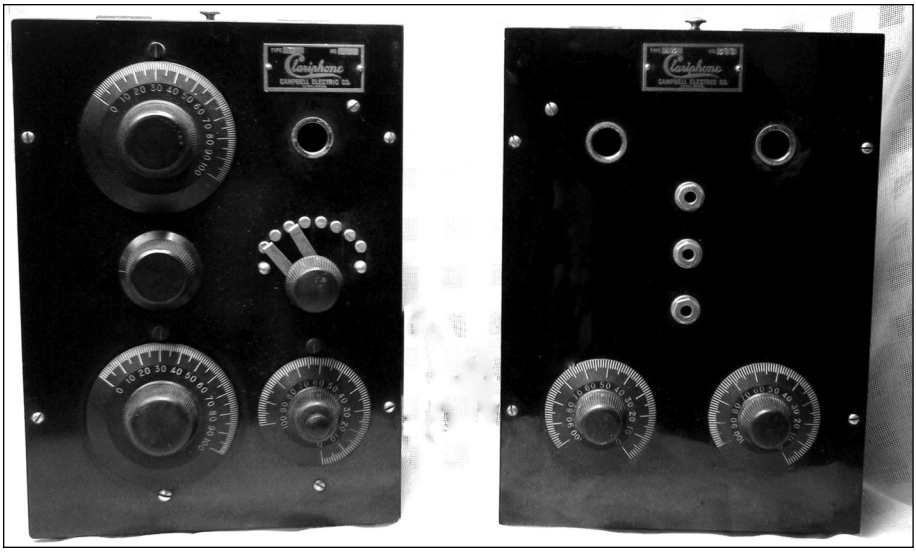


Detail from the Canadian brochure showing pictures of the D2 detector (left) and A2 amplifier.

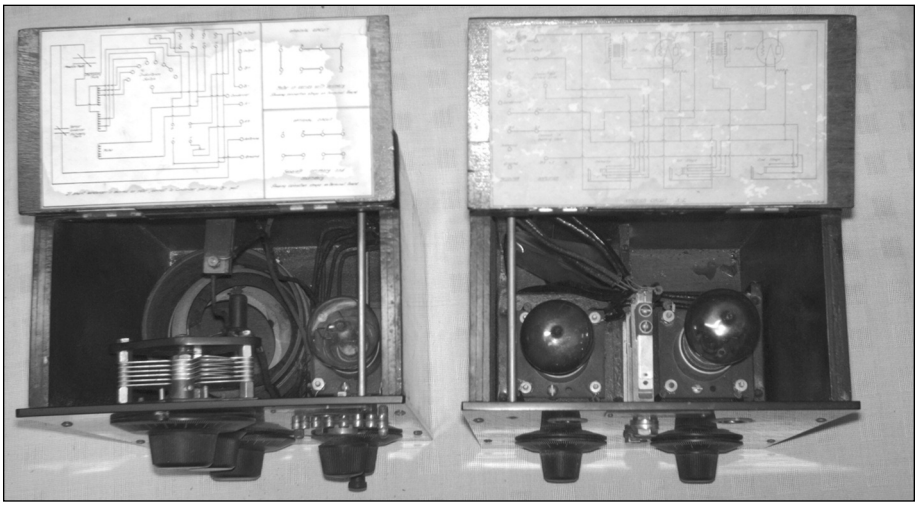
DE FOREST *cont. from page 47*

tric Company of Quebec describing the same Campbell sets — Detector D-2 and Amplifier A-2 — but including pictures.

These two units are very well made and housed in high quality mahogany cabinets. The sets tune from 150-875 meters. I believe there are probably at least five pairs known in New England. I bought mine from an antique car buff who told me they had come out of a hay barn. My Type D2 detector and A2 amplifier were the only two models that had been produced and marketed. I don't know exactly what led the Campbell Brothers to enter the radio field or to leave so quickly. Perhaps it was easy for the Campbells to jump in and jump out of the market because the startup had not required much additional investment in facilities or expertise.



The author's D2 and A2 set.



A peek under the lids of the author's D2 (left) and A2.

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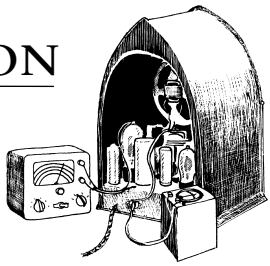
EQUIPMENT RESTORATION



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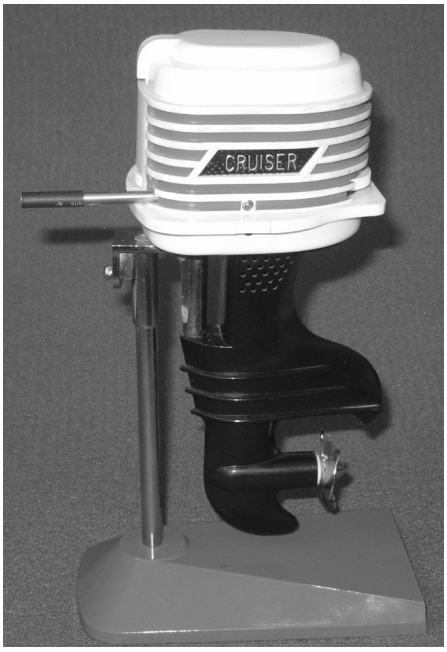
Submit restoration tips in Word, WordPerfect or plain text files with any illustrations in separate jpeg , tif or bmp files (not embedded in document).

Repairing a Novelty Transistor Radio and a Zenith Royal 500

A friend gave me a novelty transistor "Cruiser" radio that was shaped like an outboard motor. I believe it is a Japanese "Swank" product, with 803 chassis, from about 1960. The set had six PNP germanium transistors and one diode, a design similar to many others of the period. It was more or less dead so I decided to try the method for repairing transistor sets that I had suggested in the last issue — namely replacing the electrolytic capacitors.

I disassembled the set, which was relatively easy, and got the chassis on the bench with the speaker attached. I installed a pair of extension wires for the small speaker to facilitate handling as I had soon discovered that the original speaker wires were fragile at the connections and easily broke away during handling. Using a small three-transistor audio amplifier, I did a little bit of diagnosis to see if I could get any response out of the RF stage before replacing any capacitors.



My Cruiser outboard motor novelty radio.

There was some indication of reception from a strong local station but squealing prevented hearing an intelligible signal. As I replaced the four electrolytic capacitors, testing with the amplifier indicated improvement after each one was installed. But the set only really came alive on its own after replacing the last of the four, a 5 uF audio coupling capacitor.

The original capacitors were 30, 30, 50, and 5 uF, which I replaced with 33, 33, 100 and 4.7 uF caps rated at 25 or 50 volts. The replacements were about the same size or a little smaller than the originals. After removing each original capacitor, I checked it with a capacitance meter. Every one of them showed "OL" (overload) on my meter, which I take to mean they were leaking badly.

As stated in the earlier article, I used copper wick to remove excess solder from the circuit board at each capacitor terminal. Because components are mounted close together, it is important that you carefully identify the appropriate pins before removing solder. I didn't have a schematic for the set or a drawing showing the layout of the pins on the circuit board, so identifying the right pins on the solder side of the circuit board opposite their locations on the capacitor side became the biggest challenge. I used a pair of dividers as a location tool to transfer location on the capacitor side of the board to the solder side.

The removal did not involve any direct heat on transistor terminals so I was optimistic that I wasn't damaging any of these components. As the capacitors were removed, I was careful to identify the plus and minus terminal pins so that the replacement could be oriented correctly. In one case I double-checked the correct polarity by powering the set with the capacitor removed and noting the polarity of the pins using a high impedance voltmeter. The + pin will be positive with respect to the - pin. Of course If you have a schematic, you can deduce the polarity from it. Some schematics indicate the polarity of the electrolytic capacitors.

I would recommend taking a photograph of the wiring before beginning your work. Otherwise, if you inadvertently break jumper wires and other connections, you might not be able to identify where the break occurred.

The particular board I was repairing, identified as "Swank B," had a number of jumper wires connecting various points on the board, including four very fine wires coming from the ferrite antenna coils. These fine wires were not dressed very well and had been held in place by a short piece of tape on one side of the board. They made almost invisible connections to four locations across the board. I would call this makeshift so I decided to note the connections in addition to being very careful not to break them

All in all, this repair could have been made by replacing the four electrolytic capacitors in the set with no other diagnostics. However, my use of the small external amplifier gave me some confidence that repair was possible and kept me from getting discouraged. In the end, I felt more comfortable with my contention that electrolytic capacitors are the most likely failed components in radios of this era.

The chrome-plated steering handle was missing from the radio and I made a substitute using a piece of ⅛-inch brass rod with a piece of shrink tubing for the hand grip area and threaded on the other end that goes into the motor shroud. I had to file down a brass nut to fit inside to hold the handle in place. I was disappointed that the propeller wasn't designed to turn. But perhaps silent motorboating wasn't needed!

After repair and re-assembly, the radio is not only a curious artifact and example of radios that were built into various toy-like shapes, but it produces sound about as good as most inexpensive transistor radios of this period.

When I was a freshman in college in the late 1950S, one of the guys in my dorm had a red Zenith Royal 500 radio that I thought was very cool. The Regency TR-1 that I had was just outclassed, and I remembered that Zenith longingly over the years. The Royal 500 series was a very successful line for Zenith before cheaper radios flooded the market. Thirty years later I came across one at a swap meet and couldn't resist buying it. It was even red. The set played but not very well and had gotten worse by the time I repaired it this year. It's now about 50 years old.

Distortion was the worst symptom. It was fairly easy to dismantle, though the

The Zenith Royal 500 transistor radio.

electrolytic capacitors are on two sides of the circuit board and some wiring had to be temporarily moved to get to three of the four capacitors. But with these replaced, this radio sounded very good. The only reservation I had about my repair was my use of radial capacitors to replace the original axial types that were in the radio.

Radial-lead capacitors have both leads coming off one end of the capacitor, which is a logical style for attachment to printed circuits boards and is very common in transistor radios. You can purchase both types, but radial lead types are now easier to find and are generally available in more values.

I happen to have mostly radial types in my inventory. So for replacement in this particular set, I made the radial types I have look more like axial types by bending one of the leads back over the capacitor body and putting a piece of shrink tubing over this configuration. I wanted to retain the appearance of the original caps because this particular radio is collectible.

Two of the original caps were 50 uF and two were 3 uF. For the larger ones, I had only 100 uF caps on hand. I debated putting the 100 uF in as such but decided to stick with the original 50 uF value. I put two of the 100 uF caps in series, which produced 50 uF. These two were placed inside a piece of shrink tubing and the result was almost the same size as the original. I glued a paper label over each of the caps to identify value and imitate the original appearance.

I valued the Zenith radio enough to attend to this detail but for most repairs the capacitors I put in retain the appearance of current caps, which generally is not too different than capacitors from the 50s and 60s, though usually black rather than gray or white. There are caps in some radios, such as Sonys, that have a clear plastic covering on caps that you might mistake for a germanium transistor upon casual inspection. But generally, capacitors are marked with capacitance and voltage value on the plastic covering.

These two successful restorations, one of a novelty radio and the other of a notable early U.S.-made transistor radio, were accomplished by more or less blindly replacing the electrolytic capacitors. The results were rewarding and probably brought these two sets back close to their original performance.

The Zenith does a fair job compared to the later 1970s GE Super Radio, which is my benchmark set for a transistor consumer radio and one that I routinely use for entertainment listening. However, the GE is over 13 times larger based on three dimensions and much heavier. Though small, the Zenith is not a shirt pocket radio and has a reasonably sized speaker compared to smaller radios. The subsequent Model 500H, which is only slightly bigger than the Royal 500, had an even larger oblong speaker. It is one of my favorite early transistor radios with excellent sound for a small radio.

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RADIO REHAB 101

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Reconstructing an RCA AR-812 Superhet

Here in the DC suburbs we get nasty snowstorms in February. In a long-ago column I wrote up a quixotic project I started during one storm — making a superhet out of a Radiola 18 TRF receiver. When a second storm struck last winter, reason had not yet returned to its throne. Again snowbound, I dug out a salvaged front panel from a Radiola "Second Harmonic" Superhet from 1924. This was RCA's first production superhet, designed while RCA held their patents closely. It is best remembered for the "catacomb" containing all the important parts within a potted assembly, preventing any reasonable person from ever attempting repairs.

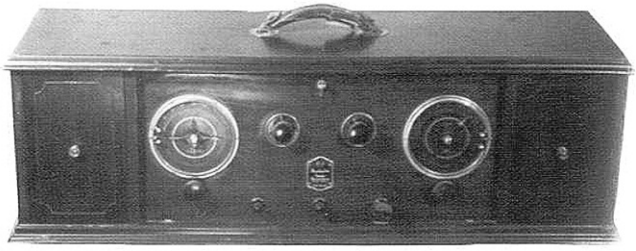

Fig. 1. RCA Radiola "Second Harmonic" Superhet.

All I had was the front panel with the oscillator coils and the terminal strip for the catacomb, plus all the panel parts including both tuning caps, two nice rheostats, three phone jack/switches, and an after-market voltmeter. I had half an idea of reconstructing the RF stages using open construction and a set of correct 199 tubes, but when I saw our cars again buried in snow, something snapped and I decided on something a little different.

Figure 1, the original AR-812, was the first production superhet receiver. Armstrong had developed the principle and patented it in 1920. The idea was to combine a strong local oscillator signal (or a harmonic thereof) with a tuned-in weak received radio signal and amplify the result.

Actually, one gets two results out of such a "mixer" circuit — signals at the sum and difference of the two input signals. Choosing one, you amplify this intermediate frequency in a series of fixed-gain stages, then detect the result in a normal way. If you tune the local oscillator and the selected station frequency by the same amount, the intermediate frequency (IF) will stay the same, and you can tune over a whole band of stations.

Armstrong and others used two tuning controls to cover the frequency band then in use. In the early days of radio, before ganged tuning capacitors and close-tolerance coils, the problem was to make sure the RF tuning and local oscillator (LO) tuning move or "track" together. This two-tuner practice persisted as late as 1932, when E.H. Scott retired the dual-tuning All-wave 12 receiver[1].

TRF sets like the Atwater Kents needed three or more tuning caps, and sometimes they were tied together with flexible bronze bands. Most other manufacturers just gave up and made the radio owner tune three separate dials to peak up a desired station. So RCA saw no difficulty in asking the AR-812 buyer to operate two dials: one to pick the station he wanted; the other to move the LO to the correct frequency.

At first RCA chose 45 kHz as the IF, but the input tuning circuitry and the oscillator were adjusted so close to the same frequency that this resulted in interference between the two tuning controls. RCA's

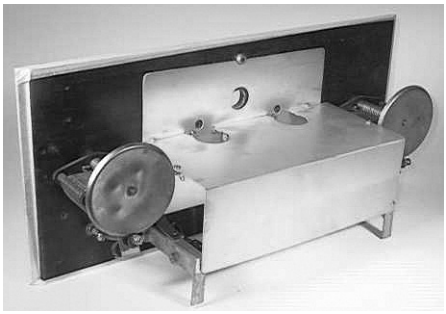

Fig. 2. Rear view of modified AR-812 panel.

solution was to use the second harmonic of the oscillator to mix with the received signal. Even so, the AR-812 had the ability to find a station at two points on the dials 180 KHz apart, because the LO could be set so that either the sum or difference frequency would get through the IF amplifiers. Thus, the weaker signal is called an "image" signal, and it occurs at an "image frequency."

I had experienced some difficulty making the oscillator and RF tuning capacitor sections track each other while doing the Radiola 18 project, and it set me to wondering how well a two-control superhet would work. Here was a perfect chance for me to find out. I "hacked" the AR-812 panel and made a new chassis for a cookbook superhet receiver to mount where the catacomb had been. Figure 2 shows how it looked as I started this project.

The two big discs back of the tuning caps give vernier tuning for both dials via rubber-tired shafts coming through the panel. A cute ball joint and spring arrangement moves each shaft. The caps themselves measured 680 pf each. The hole through the panel is where the little voltmeter was mounted. I wrapped masking tape as shown around the edges of the panel while breadboarding the receiver.

I chose 262 KHz as the IF for this receiver because I had 262 KHz transformers on hand. I thought I'd be able to observe station images all the same. We have a strong local here at 1390, and I hoped to be able to tune it in at an RF dial setting around 1128. After considerable experimentation with coil design, I arrived at the circuit of Figure 3.

Figure 4 shows how the set looks as completed. RF tuning is on the left; the two controls in the center are RF and Audio gain;

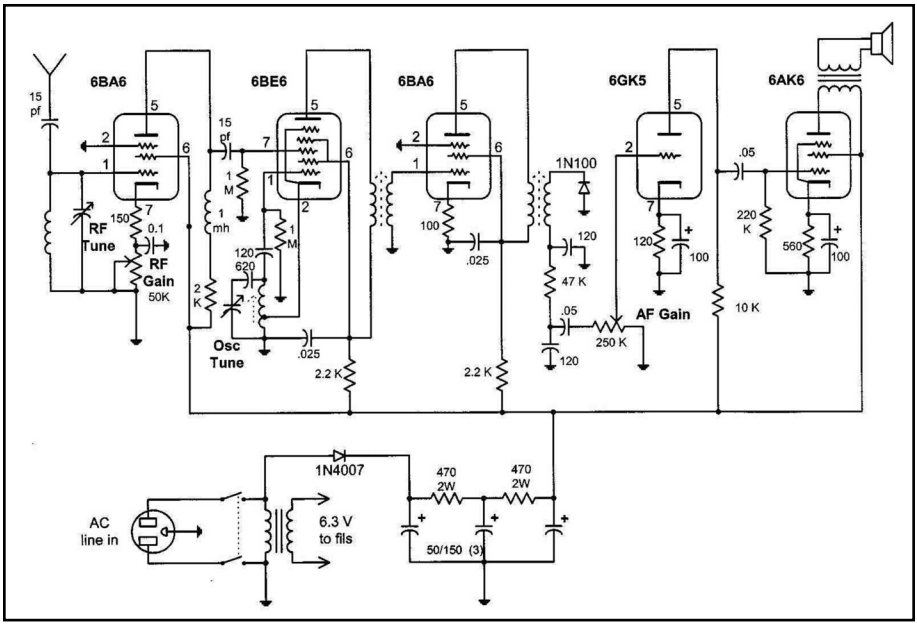

Fig. 3. Breadboard AR-812 schematic.

the oscillator tuning dial is on the right. Power switch, neon lamp indicator, and a phone jack are along the bottom of the panel. The antenna coil plugs into the octal socket on back of the chassis.

The oscillator coil is a PC-70-OSC item from Antique Electronic Supply with its ferrite coil removed. I was out of junk power transformers, so the set has a hot chassis but a polarized power plug. The RF level meter driver circuit is not shown on the schematic because it involves the use of klugey solid-state components. But this actually helps distinguish the real signal from its image.

Despite its fancy panel, it's still a breadboard and underneath the wiring is messy. I used a pair of NOS IF transformers from the parts box so just as predicted, some stations come in twice on the dial unless one tunes carefully. You have to pretend the tuning dials are ganged together, adjusting each one to about the same place on the scale and peaking both when you pick up a station. Sensitivity is plenty high — with a 20-foot wire pinned to the ceiling, there are stations all over the dials. Selectivity could be better; there are losses in the RF stage and its coupling to the 6BE6 mixer.

Fig. 4. Breadboard AR-812 receiver front and back view.

Given its stellar performance and the uniqueness of this beautiful and attractive project radio, it is interesting to note that it brought only $15.50 on eBay. Must have been during the well-known "August Radio Slowdown."

So is there some reason why we now see 455 KHz as a standard for the IF in a superhet receiver? In a modern set, with ganged tuning and an IF of 455, the image frequency for, say, 1390 KHz would be (1390 - 455) = 935 KHz. With its RF tuning set at 1390, a station at 935 would be far away from the peak response of the RF stage tank; any resultant at 455 KHz would be down by lots of dBs.

Furthermore, the choice of 455 for the IF and the spacing of US broadcast stations by 10 KHz means that a station at 930 or 940 on the dial would create an image at 460 or 450 KHz, respectively, and the selectivity of the IF amplifier will further attenuate the image signal. Armstrong, in his laboratory, found that his superhet invention could be made sensitive enough to receive thermal noise, while at the same time its selectivity would depend on the bandpass of its IF chain. By 1934 or so, nearly every production radio offered to the public would be a superhet.

I have been reviewing a group of early (1921-1939) *QST* magazines, looking for ideas for future articles. In the June and July issues of 1924 (2) is a good two-part article on making superhet tuning condenser sections track each other. Back then, some hams had the talent and the patience actually to disassemble condenser sections and *shave the plates* to get just the right alignment of tracking RF and oscillator sections! Long winters up there in W1 country. They even had time to make cabinets for their sets, too — but that's another subject.

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2 *QST Magazine, Building Superhets That Work*, Ed. Kruse, ARRL, June-July 1924

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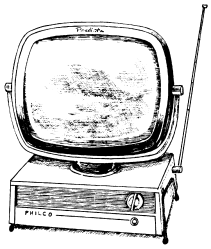
TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD, CUTCHOGUE, NY 11935 *PLEASE INCLUDE SASE FOR REPLY.*



Zworykin's CRT Transmitter-Receiver Set

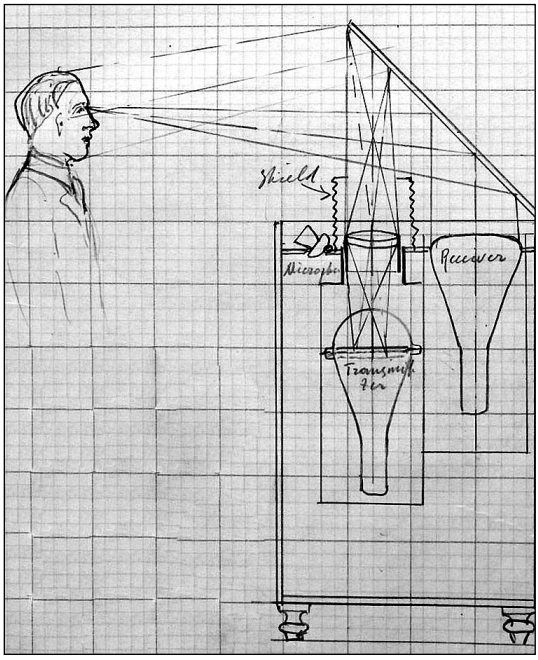
This will be my final Television column. I have much enjoyed the opportunity to research and write these articles over the last 20 some years. On the other hand, a new project has come my way, far greater than anything I have ever been involved with.

As many of you know, Susan and I have volunteered with Mercy Ships for many years, serving on two of their hospital ships in various African ports. Susan typically had a nursing position while I worked in electrical/electronics. Last summer, I accepted the position of Project Engineer, overseeing the construction of the newest Mercy Ship, the 37,000 ton Atlantic Mercy.

When it goes into service in 2018, it will be the world's largest non-governmental hospital ship. By the time you read this, we will be living in Tianjin, China, overwhelmed by the enormity of the task. For further information, look up Atlantic Mercy on your computers—rb

Some time ago, I spent hours photographing Vladimir Zworykin's lab notebooks at the Hagley Library in Wilmington, DE (see the January, 2016 issue of the Journal). These are probably the first of Dr. Zworykin's official reports developed since coming to work for RCA at Camden, NJ, under the direction of David Sarnoff. Even before his iconoscope tube was ready for demonstration, Zworykin was already thinking up uses for a new electronic TV system.

Note the careful detail in the drawing. He was ready for Skype! Interestingly, the illustration is just the second of Zworykin's Lab Notebook entries since he began work at RCA. This combination set was already suggested as far back as 1923.



Though present developments in this field considerably simplify the problem, a combination transmitter-receiver set for two-way communication could have been built as shown. In this method of construction all auxiliary circuits and power supply units are common for both transmitter and receiver. The receiver serves also as a monitoring unit for the transmitter.

NOTE:
This material was provided courtesy of Hagley Museum and Library.

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RADIO RAMBLINGS

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The Development of Radiotelephone Modulation Methods

Nearly all early attempts to transmit voice by radio were based on amplitude modulation, but the first methods were crude and awkward to implement. Attempts to modulate spark transmitters, including Model T Ford spark coils, were disappointing. The "buzz" of the spark made the modulation almost unintelligible.

A radio transmitter producing a continuous wave was needed for successful radiotelephone transmission and the only two sources of continuous waves signals that were available prior to the development of the vacuum tube were the Alexanderson radio frequency alternator and arc transmitters.

An article appeared in the May 8, 1922 issue of *Aerial Age Weekly* which describes two of these early developments:[1] Reginald Fessenden (1866-1932) used the Alexanderson alternator for his radiotelephone experiments in the first decade of the 20th century. Fessenden transmitted voice a distance of approximately 20 miles in 1906 and increased that range to 100 miles by 1907.[2] Arc transmitters were developed by several radio pioneers in the early days of radio. The most famous of these was designed by a Danish engineer, Vlademar Poulsen (1869-1942). These were used in a number of early radiotelephone tests achieving distances of several hundred miles.

In all of these early radiotelephone transmitters, modulation was accomplished by inserting a carbon microphone in series with the antenna circuit. In this application, microphone heat dissipation became a limiting factor. This stimulated a number of inventors to create fascinating microphones that could handle higher power levels. An article in *The A.W.A. Review*, Volume 4, 1989, by Bob Paquette provides a good overview of the many interesting designs that were developed.

A schematic diagram of a DeForest radiotelephone transmitter appeared in the May 1917 issue of *Wireless Age* magazine and appears here (Figure 1). The development of vacuum tubes provided opportunities to use other methods of modulation. Some attempted to modulate the bias voltage on the grid of the transmitting tube, allowing microphones to operate at lower power levels.

However. when radio broadcasting began better modulation methods were needed. The first successful method of modulating a signal electronically was developed by in 1921 by Dr. Raymond A. Heising (1888-1965), who worked for Western Electric and Bell Labs for most of his career. His method of modulation is commonly referred to as "constant current modulation." A simplified diagram of a Heising modulated transmitter appeared in *Practical Radio*, a book authored by James A. Moyer and John F. Wostrel, which was published beginning in 1924 (Figure 2).

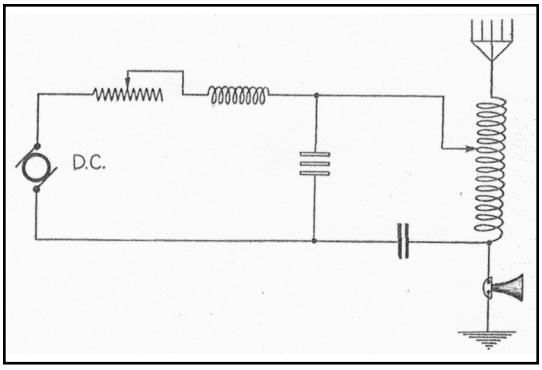

Fig. 1. DeForest radiotelephone transmitter.

The plates of the RF amplifier and audio output tube were effec-

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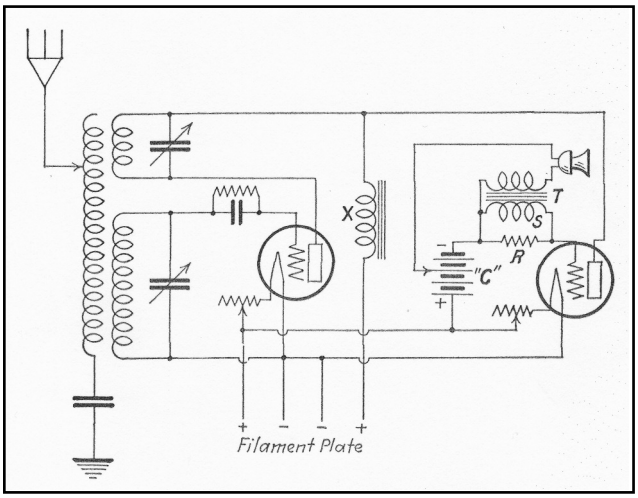

Fig. 2. Heising modulation circuit.

tively connected in parallel and received their DC power through a common audio choke, or modulation reactor, which is designated by an "X" in the diagram. That inductor had significant inductive reactance at audio frequencies. When the modulator tube required higher plate current flow on an audio peak, the inductive reactance of the audio choke reduced the voltage to the plates of both the modulator and RF amplifier tubes, causing a corresponding dip in RF output.

Heising modulation worked and was used in broadcast transmitters during the 1920s, but it had several disadvantages. The modulator tube had to operate as an inefficient Class A amplifier requiring vacuum tubes with high power ratings. More importantly Heising modulation could not achieve 100% modulation because it could never drive the RF amplifier output to zero.

Around 1930, Loy E. Barton (~1898-1986), a mechanical engineering instructor at the University of Arkansas, was given the assignment of building a new transmitter for the university's radio station, KUOA. He saw the limitations of Heising modulation and decided to improve on it by using a modulation transformer as an interface between the modulator audio amplifier and the transmitter RF amplifier.

This design allowed the modulator tubes to operate as an efficient Class B amplifier, greatly reducing power consumption. The modulation transformer also allowed the RF final amplifier to achieve 100% modulation, driving the RF power output of the transmitter from zero to twice the power of an unmodulated carrier. This could have been known as Barton Modulation, but instead was named Class B modulation and is commonly known today as plate modulation. Listeners to KUOA quickly noticed the difference in the quality of its signal, and this new modulation method was adopted by the broadcast industry by 1940.

Loy Barton did not patent his modulation method in his own name, but assigned it to RCA when he joined that company as a design engineer. He was one of the designers of the famous WLW 500,000 watt transmitter that operated under a special experimental license for several years in the 1930s.

I found an example of an amateur radio transmitter using this method of modulation in *Radio Handbook, Twelfth Edition* published by Editors and Engineers, Ltd. in 1949 (Figure 3). The modulation method invented by Loy Barton was used for nearly all AM broadcasting transmitters from the 1930s into the 1970s when digital modulation methods were developed.

This included the Westinghouse 5,000 watt AM broadcast transmitter at radio station WREN in Topeka that I operated when I was a student at the University of Kansas. To improve audio quality and avoid crossover distortion, we adjusted the bias on the modulator tubes to allow a small amount of plate current to flow when no audio signal was present. This technically made the modulator operate as a Class AB

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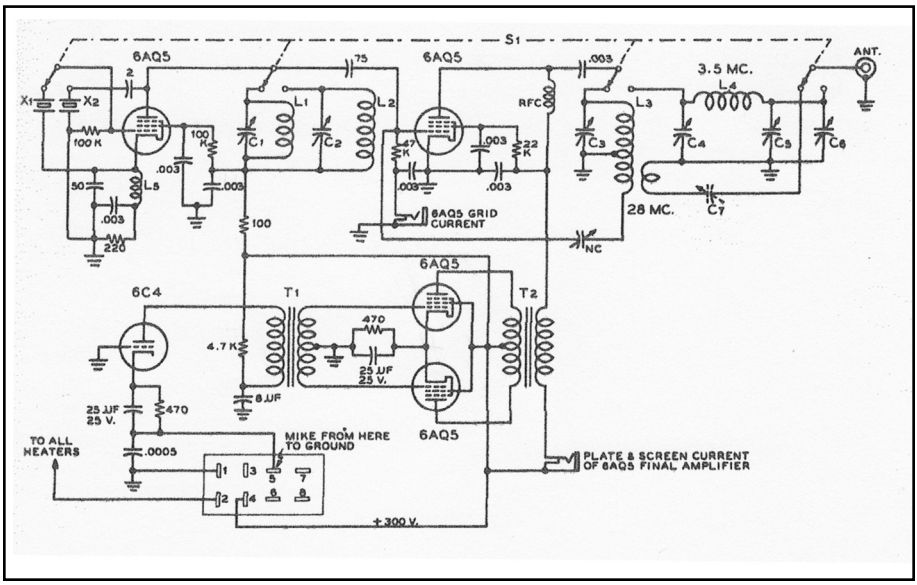

Fig. 3. Class B modulated transmitter.

instead of a Class B amplifier.

Broadcast stations also used audio processing to improve the signal quality and avoid over-modulation. The audio signal was routed through a "limiter," which was actually a combination audio compressor and limiter. When the audio signal was weak, the limiter would increase amplification to raise the level of modulation. When the audio signal was strong, the limiter would reduce its gain to keep the modulation below 100%.

For AM transmitters using tetrode or pentode final amplifiers in applications where audio quality was less important, screen grid modulation was used to reduce the cost and complexity of the transmitters. This method was used in many amateur radio transmitters, including the Hallicrafters HT-40 and Heathkit DX-60 transmitters of the 1960s. Screen grid modulation worked, but it could not achieve 100% modulation and anyone listening to these stations immediately knew that that this method of modulation was inferior to the one that Loy Barton invented in 1930.

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Bremmer Tully Power Six Kit Radio. This is a six tube 1926 Battery Set with four doughnut coils, 01As, 200A, and 112A and two tandem condensers. Gary Heisey, 55W Franklin St., Apt. 107, Ephrata, PA17522

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THE BACK PAGE

Interesting Images from the AWA Museum Archives

BY **JAMES KREUZER**, N2GHD, MEDIA LIBRARIAN

Mobile Radio Operating 1915 Style

Motorcycle enthusiasts tell us that the vehicle being used by the stalwart radio operator in this picture looks like an Indian *Big Twin* of about 1915, a model used by the Army throughout the First World War. It had a 60.88 cubic inch motor developing 15-18 horsepower.

Though basically intended to carry a passenger, the side car on this version has wireless gear installed. Some side cars were even equipped with machine guns. The configuration was left up to the army, which paid $70.00 a copy for the bare vehicle.

The wireless apparatus on this motorcycle includes an early deForest Wireless Telephone Transmitter on the left side and a Type RJ-5 Audion Detector Box next to the spark key on the right side. This gear dates from about 1915 and was the earliest mobile wireless telephone outfit ever mounted on a motorcycle. It might be considered to be an early cell phone!